COMPUTERWORLD
OA
OFFICE AUTOMATION
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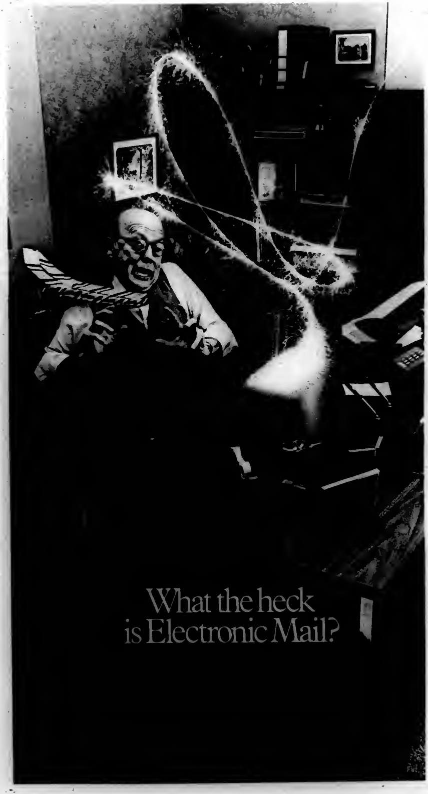
# MAKING WAY FOR THE NEW OFFICE



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# CONTENTS

Just as office automation signifies old technology making way for the new, the Biltmore Hotel on the cover photo was imploded in 1977 in Oklahoma City, Okla., to make way for new growth. The photograph is courtesy Controlled Demolition, Inc. (Phoenix, Md.), which imploded the building.

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## 9
### PRODUCTIVITY

By Michael Hammer
and Jay S. Kunin

Everyone talks about increasing productivity. What does it actually mean?

## 11
### THE USER INTERFACE

By Thomas Billadeau

User-friendly products are being claimed by almost every vendor. If new users encounter equipment interface problems, they may reject OA altogether.

## 15
### THE WHITE-COLLAR WORKER

By Frances Johnson

Who is this worker being targeted by an emerging industry?

## 21
### STRATEGIC PLANNING

By Daniel J. O'Connell

Detailed planning from top to bottom must occur if effective automation is to take place.

## 24
### WORD PROCESSING

Word processing is the most widely used application in the office today. Phillip G. Elam, Jan Duffy, Evelyn S. Wilk and Mary A. Karon share their views and provide a groundwork for implementing WP.

## 27
### THE BIG THREE

By Ann Dooley

Wang, IBM and Xerox are the top vendors battling for lead in the office automation market. Executives from these three companies share their opinions about the industry, the future and each other.

## 35
### A QUESTION OF COMPATIBILITY

By Melody Johnson

Vendors like it. Users don't. What are the alternative strategies for users forced to operate in an environment without equipment standards?

## 39
### THERE'S A NEW KID ON THE BLOCK

By George F. Colony

The recent deregulation of AT&T has opened up the office automation marketplace to Baby Bell. What obstacles must AT&T overcome before it will be considered a major vendor by OA users?

## 44
### WHAT'S ON THE HORIZON?

Office automation is an infant industry. Technology will undergo significant changes during this decade, many not even thought of yet by potential users. Some of these emerging trends are explored in a report by Gnostic Concepts, Inc.

## 51
### GETTING PERSONAL

By Thomas Wilmott

Once considered an expensive toy, microcomputers are appearing in increasing numbers on the desks of executives. Here's a look at how managers can use these small but powerful systems.

## 55
### ERGONOMICS

Office automation is intended to improve business performance. Marvin Dainoff and Richard Koffler warn that if it is accomplished at the physical and mental cost of the employees who use it, OA might prove counterproductive.

## 63
### ELECTRONIC MAIL

By Peter Bittner

What is this thing called electronic mail? How this fast-growing application is implemented in an organization and what it's used for may determine future OA trends.

## 67
### LOCAL-AREA NETS

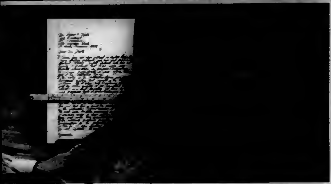
By Bruce Hoard

Local-area networks are the buzzwords of the '80s. Here is an encapsuled view of the current state of the art.

### DEPARTMENTS

Editorial .............. 4
Newsbriefs ........... 6
Q&A ................... 6
Technology .......... 77
Calendar ............. 78

# The Interac



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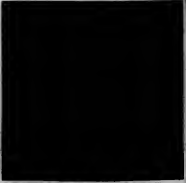

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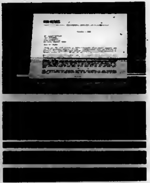

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# COMMENT

Five years ago, no one had ever heard of it. Today, office automation (OA) is being heralded as a means of reversing the white-collar productivity slump in this country. More than just the latest technological buzzword, OA will eventually affect the way in which people work, the kind of work they perform and their social interactions with fellow employees. What kind of a role will you, the MIS professional, play in this transformation of the work place?

The opportunity exists to carve almost any kind of power niche you want in this new field. But it will be up to you to come out of the computer room and move into the mainstream of the organization in order to succeed. Top management and nontechnical employees in the organization must be convinced that you can communicate in terms other than computerese and that you are able to understand and take charge of other issues besides hardware or software. The MIS manager, more than anyone, should be aware of the current rapid pace of technological development. Computer capacity is now moving out into the hands of users unfamiliar with this technology. The MIS manager who wants to remain a vital force in the organization must adapt to that change by guiding uninitiated users and managers through the technological maze that will affect their business and working lives.

The existing decline in white-collar productivity will have dire consequences on this country, where more than 50% of the work force consists of white-collar workers — a figure that is still growing 20% faster than the work force as a whole. In dollars, this figure represents a cost of some $13 billion each week, according to recent estimates. Against this background, executives are being bombarded by questions:

- What can be done about the declining productivity spiral, in which an estimated 25% of top managers' time is spent waiting for information?
- How can rising labor costs be reduced in a labor-intensive work force?
- What can be done with a work force in which fewer people will be available to perform the more routine chores and skilled employees may end up doing the work themselves?
- What can be done about the escalating travel costs to and from work or to long-distance conferences?
- How can businesses provide more information in less time?

While some people may not realize it and others will do everything they can to deny it, the answer is simple — automate.

What is the state of office automation today? It looms like the tip of an iceberg. No one knows how far it will extend, when it will fully emerge or how to navigate around it. OA no longer focuses on secretarial tasks, but has now moved on to providing automated capabilities to the manager and professional worker. Both vendors and users are in a trial and error period in which mistakes undoubtedly will be made, but, with proper implementation, significant successes ultimately will be achieved.

It was only last year that most major computer companies committed themselves in product strategy (if not yet in actual hands-on-product offerings) to automating the office. Users are attempting to learn what OA is all about and what it will mean to them, not just in terms of pie-in-the-sky technology, but in terms of actual applications and improved business methods in an organization. With its roots in stand-alone word processing, office automation has grown and will continue to evolve into a system encompassing voice, text, data and image, able to be accessed and manipulated in a variety of methods. A few users are implementing sophisticated systems, but for the most part, organizations are hovering on the brink of OA. Companies that remain too long on the sidelines run the risk of eventual failure. While they are deciding whether to automate, their competition may be advancing so far ahead they will never be able to catch up.

Whether organizations move willingly or not into office automation, they will need implementors who can draw technology and office workers into a more efficiently functioning network.

*Computerworld OA* can help the MIS professional to fill this role, to bridge the gap from the computer room to the automated office. This, the premier issue, contains articles on the latest implementation strategies, management issues, purchasing decision problems and technologies by providing a focus on personal computers in OA, a comparison of local-area networks and an evaluation of stand-alone vs. shared word processing environments among others. In upcoming issues, we will attempt to provide you, the reader, with an idea of what is happening in the industry, what technologies are available now and what's coming down the pike, how OA can be sold throughout an organization and what technology is needed to achieve an automated office. Read along with us as the year unfolds and new developments appear on the horizon.

A word about the publication itself. You will receive *Computerworld OA* on a quarterly basis as part of your subcription to *Computerworld*. We welcome your opinions, suggestions, problems and news of technological breakthroughs. **OA**

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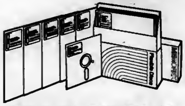

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# OA NEWSBRIEFS

**WASHINGTON, D.C. — THE U.S. VS. AT&T ANTITRUST CASE WAS SETTLED OUT OF COURT** in a decision that enables Bell to change from a telephone company to an information company, according to one Washington observer. Announced on Jan. 8, the decision requires Bell to divest its 22 wholly owned telephone companies. In return, Bell will be able to offer communications products and services on an unregulated basis.

The decision "modifies" the 1956 Consent Decree, which barred AT&T, with certain exceptions, from entering the communications market on an unregulated basis. Under the guidelines, AT&T will lose control of its local loops, but will gain entrance into computer communications. Industry observers expect AT&T to become a major vendor in the office automation industry when the company is able to gain product-offering momentum. (See "There's a New Kid on the Block," on Page 39.)

**NEW YORK — THE JUSTICE DEPARTMENT SCRAPPED ITS ANTITRUST SUIT AGAINST IBM**, ending the government's attempt to prove that IBM acted as a monopoly in the computer industry. Ending days short of its 13th anniversary, the suit was dropped after the government reviewed the case and concluded that it "is without merit and should be dismissed." The case was ended on Jan. 8 in the Federal District Court for the Southern District of New York, with Judge David N. Edelstein presiding. The lawsuit was filed on Jan. 17, 1969, the last business day of the Johnson administration, in a complaint that charged IBM with monopolizing interstate trade and commerce in the market for general-purpose digital computers.

Acting with the intention of breaking IBM up into smaller companies, the government estimated it could present its case in 60 days. Instead, it took nearly three years, and an estimated 30 million pages of paperwork changed hands between Justice and IBM lawyers between the filing date and the time the case came before Judge Edelstein.

**WASHINGTON, D.C. — THE U.S. POSTAL SERVICE'S ELECTRONIC MAIL SERVICE WAS INAUGURATED IN EARLY JANUARY** under a cloud of controversy. The Electronic Computer-Originated Mail (Ecom) was begun only after two federal courts refused to issue the temporary restraining order requested by the Department of Justice.

Ecom enables heavy mail users, such as large corporations, to transmit a minimum of 200 messages to a serving post office, 25 of which have been established throughout the country so far. At these centers, messages are converted to hard copy and delivered to the addressee by a letter carrier. A charge of 26 cents for converting and delivering a one-page message and 31 cents for two pages is assessed by the Postal Service in addition to the charge for transmission service, which is provided by commercial carriers.

Ecom's fate was in question because the Justice Department had to decide whether the U.S. Postal Rate Commission needed to approve Ecom as it is currently configured before it could operate on a permanent basis.

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# OA

# Q&A

***Q&A is a means for you, the reader, to have direct access to technological expertise in the fast-paced world of OA. Your questions will be answered by International Data Corp., Framingham, Mass., a leading research firm specializing in the computer and office automation industries.***

***How should we select a pilot project that has sufficient depth to study the potential payoffs, while avoiding the political risks involved?***

If you have top management support, you will at least have the backing needed for selecting a site. After the site is selected, it is important not to oversell the project.

The pilot project should be viewed as the last step in the planning process, not as an initial implementation. The project should be set up and sold as an experiment designed to yield specific data. Thus, while an initial implementation can be judged a failure if it does not improve productivity as expected, a pilot project is a failure only if it does not answer the questions it was designed to study.

***We have an electronic mail system that initially was very popular. Recently, the level of use has been falling off. Why is this happening?***

The best way to reverse this trend is to survey your own users. It could simply be that you are charging more for a mailbox than the traffic will bear. Maybe the users have not been trained properly or some features are too hard to use or are not available. It could be that not enough of the right people are using the system and users are frustrated by this and resorting to interoffice envelopes.

If it is too politically sensitive an issue to poll your users about their reasons for dropping out of the system, the next best avenue is to locate another company that uses the same system. You may find that a few simple policy changes could turn the situation around. Many vendors have started users groups for just this purpose.

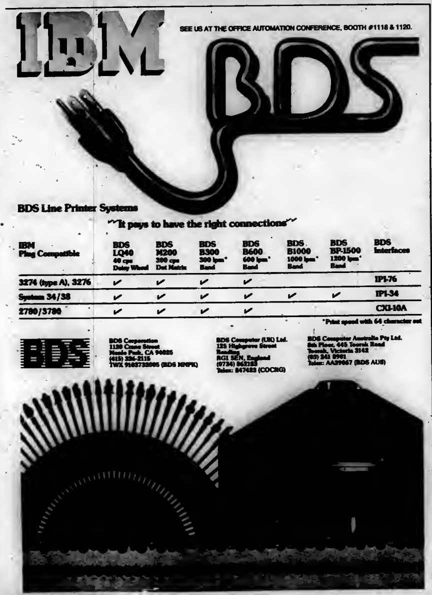
***How should we determine whether electronic mail or facsimile is the better communications link with our regional divisions?***

The first step should be to examine just what kind of information you intend to send between divisions, how frequently it is sent, who it is intended for and what it will be used for. Only when the information flow has been characterized should one technology be considered over another.

Each technology has its tradeoffs. Facsimile machines reproduce messages that cannot be edited, stored electronically or sent directly to individuals. They do, however, have the ability to reproduce anything and are less costly than installing terminals throughout an organization. Terminal-based electronic mail allows personal message flow, providing automatic addressing, broadcast to predefined lists, editing, storage and retransmission capabilities. On the other hand, image transmission is eliminated from the mix.

The key is using your analysis of your information flow to determine the impact of the cost vs. the time saved and the convenience offered by each. It is even possible that both may be found useful and cost-effective. **OA**

***Puzzled by a technological concept in office automation (OA)? Bewildered by the failure of others in your organisation to jump head first into automating the office? Readers are invited to share their questions, problems or solutions with other readers who are probably wracking their brains over the very same topics. Send your questions to Computerworld OA, Q&A Department, Box 880, Framingham, Mass. 01701.***



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## THE MEANS, NOT THE END

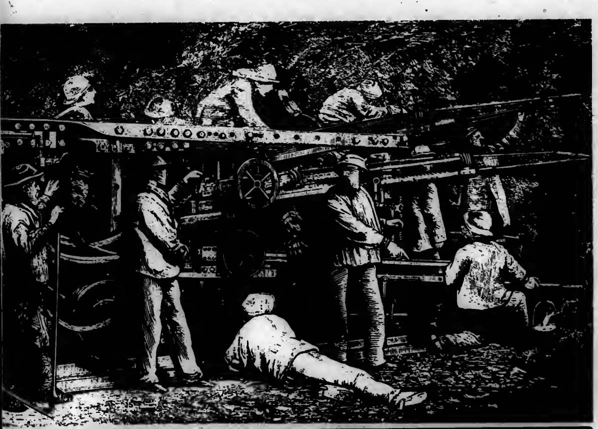
# *Productivity*

"Productivity" is currently the most popular word in the office automation (OA) lexicon. Not a week goes by without an announcement of some device, system, technique or concept guaranteed to improve your productivity or that of your office, secretary, manager or even your entire corporation.

Productivity is a buzzword that has no inherent meaning — it means whatever the user wants it to mean. Does increasing the number of documents prepared by an office improve that office's productivity? Does the use of electronic mail really enhance "managerial" productivity? If so, how?

The traditional approach to office automation focuses on the basic tasks customarily associated with office work: typing, communicating, filing, retrieving information and so on. OA technology is used to make these tasks more efficient and accurate, and productivity is measured by the volume of these tasks performed.

However, there is a fundamental flaw in this viewpoint: it mistakes means for ends, artifacts for essentials. It looks at office work in a vacuum, without any business context, and assumes that an enhanced capability to perform rudimentary office tasks is ipso facto improved productivity.



### BY MICHAEL HAMMER AND JAY S. KUNIN

I believe, however, that office work is a misleading concept, its automation is not a worthwhile objective and the term productivity is fundamentally inappropriate in most office environments. Office tasks are not ends in themselves; they are only means to achieve business objectives. Increasing the efficiency with which these tasks are performed is only of interest if it improves the business function and not just the information handling capabilities.

Office automation, narrowly interpreted, is only one component of a much larger and more important enterprise: the improvement of organizational performance. The real objective of OA is not the installation of automated systems into an office environment, but the enhancement of the business objectives of the organization, using new technology only when and where it is appropriate.

An office exists to implement some business functions that can be expressed in terms of the goals and needs of the larger organization. If it does not function as such, the office is a candidate for elimination, not for automation! In implementing an office system, the first question must be, "What is the nature of the business problems this office is facing?"

What are the implications of this functional approach for the elusive definition of office productivity? First, the current preoccupation with managerial and professional productivity is a search for the answer to the wrong question. Besides the fact that no one has devised a satisfactory way to measure this concept, the very notion of productivity is misleading in a managerial context. As opposed to a production line worker, a manager does not have tangible output with intrinsic economic value. Two memos are not necessarily twice as valuable as one memo. Further, there is no particular reason to believe that rudimentary tools such as electronic mail will have any bearing on an individual's real productivity, even when these tools can be shown to save a certain number of minutes of that individual's time. Issues of time recapture, working styles and technological tools that encourage their own overuse determine the real impact of this kind of automation.

*An office exists to implement some business functions that can be expressed in terms of the goals and needs of the larger organization. If it does not function as such, the office is a candidate for elimination, not for automation!*

Second, this functional perspective has consequences for planning and implementation. The principal goal of the OA planning effort then becomes not the establishment of a timetable by which the latest technology can be introduced into the company, but a strategy by which office systems can contribute to the improved operation of the company's business activities. Planning and implementing office automation will then be based upon a thorough understanding of the characteristics, activities and needs of the organization.

Every office in the organization is unique and must satisfy a specific set of requirements in a special set of circumstances. As a result, no approach, particularly if based on the least common denominator of office work — word processing, communications and so on — will be appropriate for all offices. Nor is there much to be gained from aggregate analytic and planning techniques based on an assumption that benefits will accrue to broad classes of office personnel as a result of using generic office tools.

Many different constituencies within the company must be involved in the planning process. The company will benefit from these perspectives and expertise and will also ensure that these groups feel they have contributed to the plan and therefore have some stake in its successful realization. Office automation is not an activity that can be imposed on an unwilling organization; both line management and staff must participate.

It is also necessary to prove the benefits of office automation on a relatively small scale before attempting to get senior management to commit to a grand plan. "Increased availability of information" is too vague and insubstantial a reason to convince management of the validity of the OA concept and the virtue of investing in it. Senior managers are understandably skeptical about committing to every new fad that afflicts the information systems field and will demand prior demonstration of validity and practicality.

The key initial step in the development of an office systems plan is therefore the implementation of one or more pilot studies (sometimes known as model offices). A pilot is not an experimental environment in which new and unfamiliar technologies are tested. Rather, it is a prototype of the larger scale automation effort that is to be applied throughout the firm.

The pilot begins with the selection of a unit to serve as the site of an effective demonstration of the benefits OA can bring to the company. A study is then made of this unit to identify its real needs and to determine how automation can address them. This study is then followed by a small-scale implementation effort to demonstrate the benefits can, in fact, be realized and to assess implementation costs that might actually be incurred in a production environment.

The results of this study provide the basic information needed for full-scale planning: an understanding of business operations, an identification of the objectives for OA techniques that can be applied in addressing the needs of business units and an appreciation for how and to what extent objectives can be realized.

A secondary benefit of the pilot/prototype approach is that a successful initial effort can have substantial impact throughout the company. It can raise the credibility of the OA group, especially in situations where the data processing organization has a checkered track record and reputation. When other units see the success the pilot organization has had with its system, they will begin to agitate for their own installations. This will greatly simplify the problem of disseminating an understanding of and an enthusiasm for OA within the firm.

The concepts summarized here are not speculative or controversial. They have been demonstrated in practice by many firms that understand the capabilities of office systems technology, but recognize its limitations as well. With an emphasis on business mission and function and an involvement of the user group, office automation and productivity can mean major improvements in the ways offices achieve their objectives.♦ **OA**

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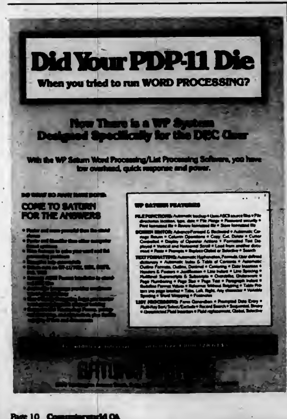
*Hammer and Kunin are with Hammer and Co., a Cambridge, Mass.-based management consulting firm that specializes in the impact of new technology. Hammer is also an associate professor of computer science at MIT.*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EASING THE MANAGER INTO OA

# The User Interface

The components that make a system user-friendly or user-unfriendly may be deciding factors in how easily automated office systems are accepted in many organizations. If the user interface is easy to use and helps to get the job done more quickly, more easily and perhaps more accurately, professional staff and middle managers alike will fight to acquire this new technology.

The user interface is that part of the computer or word processor (also a computer) which facilitates communication between human and machine. There are a number of parts that make up the user interface: the video display screen; the keyboard; any cursor-moving or option-selection device such as a mouse, cat, joystick or touch screen; and the software.

Much research has been done on user interfaces in an attempt to determine how best to get a select group of individuals to use a computer even if they don't like it. No matter how wonderful or innovative these interfaces, those who want to find an excuse for not using a system will do so, despite the offering of a cat, mouse, or even joystick! Why, then, is there so much work in this area?

The answer is that while some people simply do not want to use a computer, others who are willing to accept new technology are intimidated by a system that is difficult to operate. Far too many systems tell the user he has made a mistake, but offer no solution — a very frustrating situation. It seems clear that if vendors are to penetrate this market of potential users,

## BY THOMAS BILLADEAU

systems must be made easier to operate, easier to learn and more forgiving in their feedback.

Certainly, executives are in this group of potential users. Decision-support systems are becoming an important tool for those who need up-to-date information to make sound business decisions. Some unique challenges exist for the vendor that wants to make a system user-friendly enough to be used by a busy executive:

1) It must be easy to learn. We estimate we can have approximately 20 minutes of an executive's time to explain how to operate this new tool. In essence, that means we must be able to communicate the concepts in 20 minutes. Then we must provide the executive with a means for self-training on an as-needed basis.

2) The system must not require the executive to seek third-party assistance. A great deal of pride exists at this level in the organization. If learning and operating the system is between the executive and the system, it is confidential. If another person must be brought in, for example, the system administrator or a trainer, the executive must admit defeat. For some this is not a problem; for many it is a serious one.

3) The system must provide alternatives. An executive will not utilize a system that provides information in an inconvenient format. The executive is accustomed to having things his way; the system must accommodate this need.

***The executive is accustomed to having things his way; the system must accommodate this need or he will not use it.***

Several other larger groups of individuals — middle managers and professional staff — will also require very user-friendly systems in order to embrace automated office tools.

Until recently, most automated office tools have been aimed at support staff and at specially trained technical staff in the office. However, it is clear that the potential return on investment for utilizing automated office tools is higher at the levels of professional staff and middle management than at any other. Organizations will want to implement automated office tools at these two levels successfully.

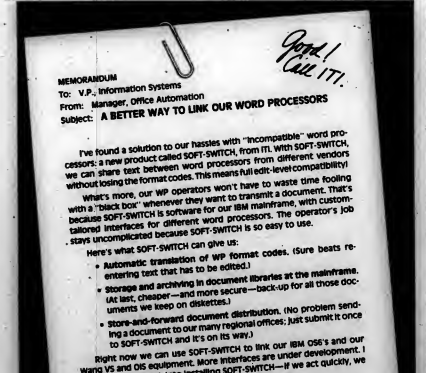
Why do systems have to be easier to use at these levels in the organization in order to be successful? Because it is much easier for management to dictate how support staff will carry out their duties than to dictate how a member of the professional staff or a middle manager will do his or her job. It boils down to making potential users want office automation technology.

Some products being offered in the OA marketplace today give examples of easy to use systems or, sometimes, not so easy to use systems.

Xerox Corp.'s 8010 Star information system has garnered more attention than perhaps any other workstation announced in the recent past. According to Xerox, Star is aimed at the professional staff person in the $3,000 to $5,000 monthly salary bracket. This potential Star user might be a technical writer, an editor in the corporate communications area or a personnel policy administrator; whatever his position, it is safe to assume he is in a document creation-oriented position.

The Star concept assumes text entry is done by a typist at a word processor and that editing, formatting, graphics creation, integration and everything else that happens to a formal document (including choice of typeface, point size, page makeup and so on) is performed by the professional.

**The Star Information System**



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I've found a solution to our hassles with "incompatible" word processors: a new product called SOFT-SWITCH, from ITI. With SOFT-SWITCH, we can share text between word processors from different vendors without losing the format codes. This means full edit-level compatibility!

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- Store-and-forward document distribution. (No problem sending a document to our many regional offices; just submit it once to SOFT-SWITCH and it's on its way.)

Right now we can use SOFT-SWITCH to link our IBM OS6's and our Wang VS and OIS equipment. More interfaces are under development. I recommend we look into installing SOFT-SWITCH—if we act quickly, we can take advantage of the special introductory price.

In my opinion, SOFT-SWITCH can save us a lot of time and aggravation (not to mention labor costs), and we'll be giving our users a truly integrated office system. Let's contact ITI today for more information!

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The professional is expected to accomplish this by using a "point to what you want, then follow the instructions" methodology. The user moves the cursor around the screen by means of a "mouse" —an oblong unit with two buttons on top and a rolling device on the bottom. As the mouse is moved around on the desktop, the ball on the bottom of the unit rotates and tells the system to move the cursor on the screen. The mouse is used in conjunction with the keyboard.

> ***"Star's user interface can be rated as excellent . . . but the Star workstation is not without problems."***

The keyboard on Star is very basic and certainly not intimidating. All the keys perform the same functions, no matter what application the user is executing. The delete key applies to documents, characters, words, lines and so on. In addition to performing some functions by depressing keys on the keyboard, the user has to execute some functions by pointing to them on the screen and depressing the select button on the mouse.

An important aspect of Star's ease of use is that the screen is supposed to simulate a professional's desktop. Rather than using words to tell the user what is on the screen at any given time, the system uses pictures, which Xerox calls icons. The icons represent items that would appear on the user's desk — documents, folders, files, printers and so on. As many icons can be added to the system as is necessary to represent new functions or capabilities.

Star's user interface can be rated as excellent and indeed very friendly based on ease of use, ease of learning and logical design. But the Star workstation is not without problems. In fact, much has been made of the problems from which it suffers: high cost, high cost of peripheral devices and too much function for its intended user.

The only problem upon which I want to expand is the issue of too much function for its intended user. Certainly a large part of a friendly user interface is that the workstation perform what the user wants it to perform, and that is where I believe Star fails. It dumps on the professional the responsibility for performing functions that are not in his job scope, like formatting, final document assembly and typesetting-related responsibilities. While the professional will undoubtedly want to review the end results of these steps, I am convinced that he is not ready to perform them.

Star's complexion will change this year. We will see son of Star and/or daughter of Star. Perhaps the new offspring will keep or improve upon the good interface, while targeting the actual functionality at the person who will realistically perform the job.

Wang Laboratories, Inc. takes another approach to the user interface. Wang's Alliance Audio Workstation uses voice as part of the interface. Don't let your mind take you to the outer limits; this is not a voice recognition system in which a user says something and it appears magically on the CRT screen. This is much more primitive. Wang is allowing a user to access an electronically stored typed document, to display it on the screen and to annotate it using the Audio Workstation. Wang is also allowing the user to integrate its voice mail system, Wang Digital Voice Exchange (DVX), with its electronic mail system, Mailway. A Mailway message can be created and then annotated utilizing DVX.

Finding things in a file on the Alliance system is also handled well from a user interface perspective. One can retrieve documents simply by typing words that exist in that document. A user might type four key words. The system would respond "I have 12 documents that meet that criteria." The user might then enter further qualifiers, like a date or more words. The system would respond "I have four documents that meet that criteria." This process can continue until the user has specifically identified the document or group of documents desired.

**Wang's Audio Workstation**

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printing a document, the Wang system has always used a very easy-to-follow menu approach. The menu approach, which a number of systems are using, simply lists the options available to the user at a given time. The user selects one, then proceeds. After selecting an option from a menu, the Wang system guides the user along, through the use of prompts and error messages. Prompts tell the user what he or she must do to continue. Error messages tell the user what was done wrong and how to correct it.

The user interface on the Wang Alliance and OIS system must be rated very user-friendly. Although it has not attracted so much attention in the professional workstation marketplace as Xerox has, Wang does have a very large base of users. Most of the users are still at the support staff level, but we are seeing more and more Wang systems being used as professional and managerial tools in the office.

Other vendors have announced or will announce additional approaches to the user-friendly interface challenge. Syntrex, Inc., an Eatontown, N.J., office systems vendor, uses a combination of menus, mnemonic codes and frequent prompts to make its system user-friendly. Its filing system is based on a world familiar to everyone from their preuser experience — documents, file folders and drawers.

The Syntrex system employs windowing, which involves dividing the display into sections and allowing the user to perform more than one task at a time. Windows can also be used to explain codes. Instead of a meaningless code character being displayed on the screen, a window opens and a full explanation can be displayed.

Syntrex also uses a "help" facility — a key on the system which provides guidance in performing a selected function. Syntrex' help facility is not as good as it could be, but it could improve as the system develops. The help facility on any office automation system must be available to the user at all times and should give the user information in levels. In other words, the first level of help might be a rather cursory explanation of the functions that could be performed at that given moment. If the user needs more detailed help on a particular function, it should be easily accessible.

The Information Station 1000

Savin Corp. is a newcomer to the OA marketplace. Although its product is very new, it seems to be heading in a very interesting direction in terms of user interface. Savin's system, designed and manufactured by Convergent Technologies, Inc. employs menus, prompts, error messages, a help facility, windows and a new and very interesting keyboard. The keyboard uses touch-sensitive panels along the top to allow the user very easy access to commonly performed functions. Initial response to this yet undelivered product has been positive, but until it is actually in use, it will be difficult to judge its success.

Hewlett Packard Co., another new entry into the OA marketplace, takes a different approach to its keyboard by utilizing soft keys — a particular key can perform more than one function. The function a key can currently perform is identified on the bottom of the CRT screen. This approach, of course, cuts down on the number of necessary keys and allows the keyboard to look simple.

Vendors have just begun to explore the many methods to approach the user interface. Not so long ago (in fact on many current systems) the user had a computer keyboard and had to speak a special language to communicate with the computer. With new possibilities and the use of imagination, many new user interfaces will be designed in the next few years.

Will vendors settle on one particular interface? No. The decision will be up to the user, as he answers the question: "How do I want to communicate with my computer workstation?' " OA

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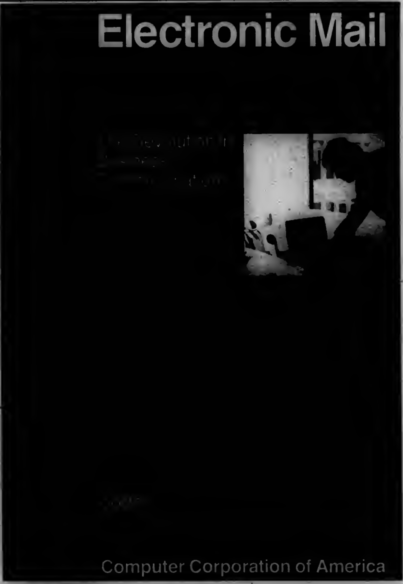
*Billadeau is president of Automated Office Systems, an office automation consulting firm, and editor of a monthly newsletter with headquarters in Boston.*



Computer Corporation of America

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# The White-Collar Worker

The diversity of offices frequently makes it difficult to think about office work in a general sense, and we naturally find ourselves falling back on a mental image of some particular setting. Our imagination balks at putting the local real estate office, for example, in a category that also includes an office of a Fortune 500 manufacturing firm. Nevertheless, office automation (OA) is spreading into every area of business activity, with a diversity equal to that of its white-collar users. At the most everyday level, copiers have taken over the work of moving information from one piece of paper to another. Word processors effortlessly rearrange words within a document. Data networks rush volumes of information over distances, bypassing paper altogether. By making information easily accessible, office automation gives people the opportunity to invest more time in key, high-value aspects of their jobs.

### BY FRANCES JOHNSON

Today, office automation is more than just the movement of information or the processing of information. It is the ability to perform these activities in the context of our own offices, at our own desks, without the intervention of a computer specialist. Office automation is the application of advanced technology under the personal and direct control of white-collar information users.

**G**iven this meaning, the need to understand who office automation users are and how they do their jobs carries obvious importance. Designers, clearly, must know for whom they are fashioning these personal tools. Users must be able to judge when significant productivity impacts are able to compensate for higher per capita investment. Furthermore, for the costs of development to be spread over a large customer base, areas of common ground must be found along lines of user demography, office function or other user characteristics.

> ***OA is the application of advanced technology under the personal and direct control of white-collar information users.***

For example, for those individuals using automation products that function as personal workstations, the customer base outlines would tend to follow the patterns of distribution of the white-collar labor force. For other products that are shared by a number of users in an office, the customer base might more appropriately be described in terms of the distribution of business establishments or other work places. Rarely does either view alone provide enough information; each contributes in various degrees to an understanding of the marketplace.

**F**or purposes of analyzing office automation users, let us imagine we can take all 4.6 million individual business establishments in the U.S. and sort them into rows, according to type of business. Wholesale and retail establishments would be placed together in one row, manufacturing establishments in another and so on. Each row will then be sorted into stacks of establishments similar in size of their work forces. All the very small establishments would be piled together, then the somewhat large establishments.

The results would look something like the drawing in Figure 1. In every row, the stack of very small establishments towers over all the rest. The tallest stacks of all represent the very small service and trade establishments. In fact, more than 85% of all U.S. establishments employ fewer than 20 people.

This huge sector of American business is not outside the reach of office automation. On the contrary, the size of the market potential it represents is having a profound impact on the evolution of office automation products.

For example, these small offices are not typical sites for large shared-logic word processing systems. There just are not enough

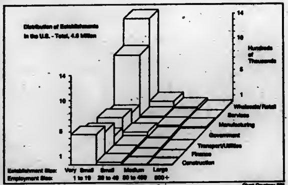

Figure 1

Chart Courtesy SRI

Local coaxial network

Advanced digital PBX

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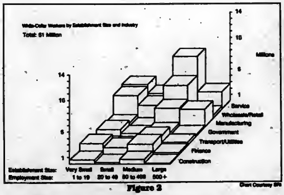

**Figure 2**

Chart Courtesy SRI

typists in one place to make that practical. Office automation suppliers are responding with modular systems whose parts can operate in stand-alone fashion as well as in networked configurations. A building block approach to office automation broadens the applicability of system components and helps to bring about lower costs for everyone involved.

As a result, the huge numbers of potential users within very small offices are forcing the gradual displacement of shared-logic design by the more flexible shared-resource concept.

However, although small office automation users are gaining more clout in the marketplace as time goes on, the leading edge has been and continues to be the large business establishment. If we assemble the stacks in Figure 1 along different lines, we can see evidence of other forces besides sheer numbers of establishments.

Keeping our original rows sorted by types of business, we now take the white-collar workers themselves out of their offices and stack each person on the shoulders of another. All of the work force from very small establishments would be assembled in one tower, workers from somewhat larger establishments would make another tower and so on, until we again have four towers in each row. This time, they are made up of white-collar workers rather than establishments. The resulting outline would be similar to that in Figure 2.

***The concentration of many people over relatively few sites tends to make the large-establishment market a gateway for new OA products.***

The pattern of distribution of the labor force in Figure 2 is strikingly different from the pattern of establishments in Figure 1. Almost 60% of the 51 million white-collar workers are found in medium-size and large establishments. The largest establishments now carry 75 times more weight than is indicated by numbers of establishments alone. It is the concentration of many people over relatively few sites that tends to make the large-establishment market segment a gateway for new office automation products.

The high ratio of people to places in this segment facilitates office automation in various ways. Because of the high degree of internal coordination required, office activities tend to be standardized according to regular procedures, which in itself presents an opportunity for automation. Furthermore, coordination and control activities generate more interoffice communications, more memos, more meetings, more training and more data capture and storage.

Large establishments seek out office automation solutions, not necessarily because they can afford to invest more dollars per person than small establishments, but because of the greater effort required to maintain a complex of human interactions in the

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The advanced PBX is a less expensive way to connect information users, but it's not quite as fast as coax which may be a drawback for heavy users.

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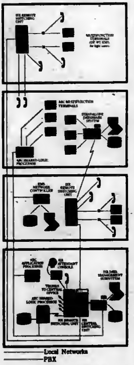

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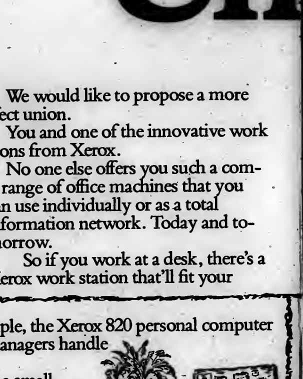

But it doesn't stop there. If you have a small business, it's perfect for your billing, payroll and ledgers. And it's very easy to use.

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office. As the number of people sharing common information increases, the benefits of improving information flow accumulate throughout the complex. In a small organization, the same information may be concentrated at the desk of one person or within a small work group. The effort required for interoffice communication is then considerably less and the benefits of office automation correspondingly lower.

The needs of office automation suppliers also have a role in making the large-establishment sector a primary entry point for advanced technology. Vendors find it cost-effective to market to large establishments because of the large user base that can be addressed through a relatively few purchasing channels. Direct selling is effective but expensive for the sales organization. To be economically feasible, average sales volume per sales call must be relatively high.

By nature of their larger labor forces, the large user organizations can provide this volume; small organizations cannot be approached cost-effectively in the same way. As a result, we see a diversity of marketing channels developing: direct sales, dealer outlets, catalogs and retail stores. Where sales volume is spread over large numbers of different purchasers, the direct support available to individual purchasers diminishes. The economies of selling tend to sort basic, easy-to-implement products into the small-establishment markets while complex, high-performance products are portioned into the large-establishment markets.

Another way of looking at office workers is to lift them out of their business establishments and their industry sectors in order to focus on the types of jobs they do. What kinds of people are we talking about under the broad label of "white-collar?"

White-collar occupations are typically classified into four main groups: professional, managerial, clerical and sales. These groupings still contain a diversity of jobs. By virtue of their specialized education and training, professionals are the most varied of all. No single product or uniform approach to office automation is likely to succeed equally with teachers, doctors, engineers, lawyers and so on.

| White-Collar Workers (51 Million) | |
|---|---|
| Professional | 16.2 |
| Proprietors, Managers and Administrators | 10.8 |
| Clerical | 17.8 |
| Sales | 6.2 |

Figure 3

The same is true of managers. The needs of a small business proprietor are not the same as those of a department head in a large organization.

> ***The challenge for OA now is to move directly into the offices of managers and professionals to raise the level of support even further.***

The largest white-collar segment, clerical workers, has until recently been the primary focus of office automation, for two reasons: First, many aspects of clerical work are relatively structured and routine and therefore lend themselves to automation. Second, insofar as clerical workers perform valuable support functions for other workers, improvement in clerical productivity translates into productivity improvement for the entire work group. Information moves faster, the quality of documents improves and the clerical worker's time can be applied more flexibly as support requirements change.

The challenge for office automation now is to move directly into the offices of managers and professionals to raise the level of support even further. To attempt this by bypassing the clerical worker altogether risks transferring back to managers and professionals some of the tasks they have previously delegated.

The role of office automation is to provide more time for creative thought and people interaction — parts of every job in the office hierarchy. **OA**

*Johnson is an office automation industry consultant at SRI International's Office Automation Opportunities Multiclient Program, Menlo Park, Calif.*

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## HOW TO GET THERE FROM HERE.

# Strategic Planning

Project planning for office automation (OA) is the process of deciding on the objectives of the organization, evaluating the role of office automation, determining the resources needed and developing the procedures for acquiring and using these resources. The pattern of work in an OA project follows a repetitive pattern characterized by good times and bad times.

The first step in office automation planning is to break the project into discrete steps or phases that serve as control instruments as well as checkpoints for review. They also provide the framework for problem definition, objectives, estimation of resources (time, people and equipment) and scheduling. As each phase is completed, prior phases should be reviewed to ensure conformity and to gain a better understanding of the problems. For example, early interviews may have provided misleading information regarding executive or clerical work load, and design speci-

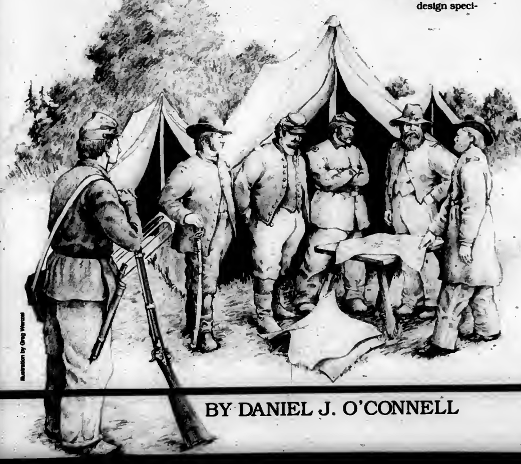


Illustration by Greg Wenzel

### BY DANIEL J. O'CONNELL

fications may be in error since each phase builds on the prior one.

The motivation for office automation is generally a need for improved productivity. With a general decline in office productivity of some 4% between 1977 and 1960, this is certainly understandable.

The preliminary survey will determine if further study is justified and should be neither exhaustive nor lengthy, lasting generally three to 10 days in duration and utilizing one or two people. The tasks in this phase should include determining problem boundaries, identifying participants and establishing terms of reference.

The results are then presented to a planning or steering committee, where the decision to proceed or to cancel the project is made. If the steering committee approves the plan, the preliminary survey acts as the basis for a more comprehensive document referred to as a feasibility study.

A feasibility study commences with an in-depth definition of the problem and should identify alternatives and recommend a solution. A priority list of needs should be developed so alternatives can be evaluated properly and lower priorities or wants can be eliminated or postponed.

This will involve research on available technologies and, even more important, on the business needs of the organization and "how much" office automation can be accepted.

The estimate and availability of resources must also be considered. Develop a plan covering how long the project will take, the various skills and people that will be required and a preliminary statement of equipment that will be needed. Estimating is necessary so that management can make a decision, but at this stage the estimate is only approximate.

Benefits can be broken into three categories: cost reduction, cost avoidance and intangibles. Intangibles would include "the competition is doing it," customer relations and quality of work life.

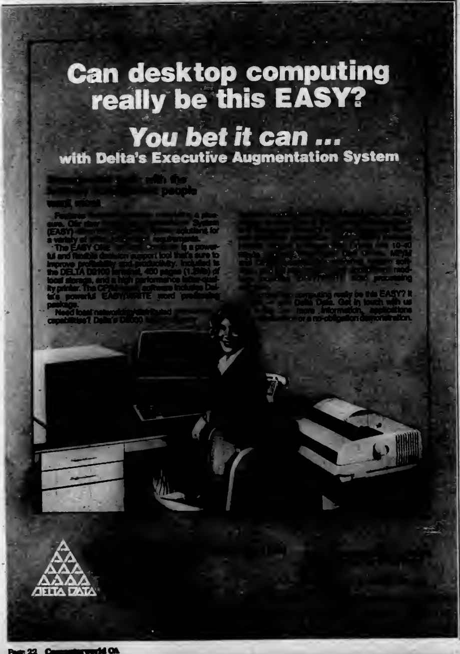
***Many studies do not consider organizational impact — one prominent reason some office automation systems fail.***

The final aspect of the feasibility study is to assess how it will fit into the existing structure and how it will interact with DP. Many studies have not considered organizational impact, which is one of the most prominent reasons some office automation systems fail.

A document information movement report, which allows the project team to understand how paper (data) moves in the existing office system, and a document dictionary, which is a central repository of commonly used standard letters and reports, are two segments of the functional specifications. These should also include an impact statement, a preliminary equipment and site preparation specification and drafts of the user guide, acceptance test plan and the training plan.

A sign-off of the responsibility agreement between the project team and the users marks the completion of this phase.

Detailed design specifications are prepared when the responsibility agreement is approved by the



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steering committee. These finalize the interface formats, the hardware/software requirements, the user guides and the plans for testing and training. Also included in the design specifications are the limitations of the system and disaster backup plans.

Because office automation frequently requires the procurement of equipment, many corporations use the design specifications as a basis for either a request for proposal (RFP) that can be sent to vendors for bidding purposes, or a document that can be used for sole-source procurement.

> ***If no problems are encountered, your project certainly will be the first to make that claim!***

The implementation of the system is approached in a modular fashion. Each of the nodes (word processing, reprographics, micrographics) is individually brought up and then interfaced through networks (local and remote).

The development phase involves documentation efforts, including refinements of the technical and software specifications, the testing plan, the training plan and the user guides.

Frequently, we hear the lament from OA teams that the project was on or ahead of schedule until this phase. The problem can generally be traced to faulty craftsmanship in the design specifications and not to the development phase itself.

The development phase involves training the users, distributing training materials, arranging for classrooms and everything necessary to gain all-important organizational acceptance. Acceptance testing is conducted after user training and involves testing each component separately (modular), testing all components together (integrated) and volume testing to verify the maximum operational capabilities.

Some organizations are experiencing success with training selected users who will then act as trainers for the remainder of the organization.

The implementation or operational phase of the office automation system should be relatively straightforward. In reality, however, this is a hectic and overloaded period. It involves final acceptance, minor tuning for responsiveness and the closeout of the project with the turnover of stewardship to the users.

Murphy's law generally is alive in this phase. If no problems are encountered, your project certainly will be the first to make that claim!

The final phase is a postimplementation audit or evaluation involving a total review of the system to identify problems and to verify that the system is operating as planned.

A review of the actual benefits and costs is conducted in this evaluation, which usually occurs six months to a year after the system has become operational. Audits can be most helpful, and for that reason internal auditors are being seen as ad hoc members of the office automation project team. Their early involvement can prevent problems from occurring. OA

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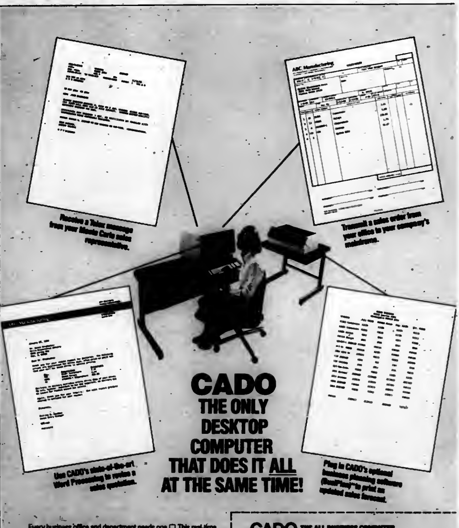
*O'Connell is senior consultant at International Management Services, Inc. in Framingham, Mass.*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# On Word

Illustration by Gordon Stanley

## Planning for Word Processing

Although an estimated 350,000 word processing workstations are currently being used throughout the U.S., selecting the right system is only a small part of the problem that occurs when an organization introduces and implements new technology.

Among other issues that must be addressed are properly defining existing and potential uses for WP, identifying and selecting WP operators, providing for the human engineering design of the working environment, dealing with pre- and post-implementation issues and determining effective operational procedures and methods.

One of the first and most critical difficulties a firm can encounter is the lack of industry standards. Even the most cursory review of WP vendors' sales literature will reveal widely diverse approaches and solutions to an organization's WP requirements. Confusion and frustration are common elements in an organization's attempts to categorize, match and evaluate the "apples and oranges" in WP technology and approaches.

Even the straightforward task of identifying the equipment's basic capabilities can be difficult as

*(Continued on Page 26)*

### BY PHILLIP G. ELAM

## Choosing the Right Configuration

The true potential of word processing, its cost-effectiveness, position in the organizational structure and role in the integrated office are currently subject to much concern and confusion. Some common misconceptions exist that the only function of WP is automated typing; or, that in order to be cost-effective, equipment must be utilized 100% of the working day; and, in order for a person to effectively use WP equipment, all other kinds of work must be removed from the job description.

The real potential of word processing is still to be discovered by the majority of users.

Because WP equipment requires a relatively large capital investment and exhibits a vulnerability to rapid obsolescence, its acquisition warrants careful evaluation of all available products. This evaluation will not be easy, considering the large number of vendors currently marketing an even larger variety of WP equipment. A very basic listing of equipment would include stand-alone systems; shared-resource systems; shared/distributed logic systems; cluster systems; and a diverse selection of WP software packages for mainframe or

*(Continued on Page 71)*

### BY JAN DUFFY

# Processing

## Looking at Software

"The automated office is coming! The automated office is coming!" Sometimes I feel as though I'm listening to a a cacophany of carnival barkers touting a new elixir guaranteed to cure all office ailments.

In fact, the automated office is already here — at least some pieces of it are. For years now, one of our major building blocks has been sitting on secretaries' desks — the word processor. We should therefore look carefully at WP capabilities and see what is available in the market today to turn word processors into full-fledged tools for the automated office.

This article will address four questions:

- What office automation (OA) software is available on word processors?
- Where is it available?
- What should you be looking for when you are selecting software packages for your word processors?
- What types of additional software are needed to make WP equipment full-fledged tools for the automated office?

(Continued on Page 73)

BY EVELYN S. WILK

## When It Doesn't Work

Managers who introduce new technology as a means of improving office productivity are often surprised by the reactions of their staff. People adapt to technology in a myriad of ways, only some of which are predictable.

The problems and some of their solutions are illustrated in the following case history:

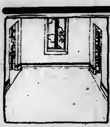
New equipment brought into an organization directly affected the work of two kinds of people. The first group consisted of a staff of skilled typists who had to be able to type at least 60 words a minute accurately; be well-grounded in grammar, spelling and punctuation; and possess superior vocabularies.

The second group consisted of professional research personnel, some of whom were in senior management and all of whom were skilled in identifying and analyzing problems or researching areas of special concern to the company's clients. Upon conclusion of their studies, the reseachers prepared extensive reports, ranging in length from 50 to 150 typewritten pages.

Typically, two weeks would elapse from conclu-

(Continued on Page 76)

BY MARY A. KARON



**Planning for Word Processing**

*(Continued from Page 24)*

users become sidetracked by "bells and whistles." Although these features may provide significant benefits for a highly evolved WP user organization, they may have little real value for the entry-level user.

To be able to evaluate features of potential value, users must establish both short-term and long-term WP objectives. Evaluating WP system capabilities becomes infinitely more easy after an organization has identified initial and future applications and established a definition of implementation priorities.

Many organizations have tended to delegate to a single individual the authority to identify, evaluate, and recommend WP equipment — usually pushing the decision too far down in the organization. Others have allowed each department to select its own WP equipment, with consequences ranging from a complete disregard of WP needs for the organization as a whole, a lack of commonly defined and universally applied set of selection criteria, to a series of equipment configurations that prove to be incompatible from a WP network integration perspective.

The evaluation process also frequently excludes the very personnel who will, in fact, become WP operators. Eliminated with them is a critical perspective on the WP system — informed opinions on the operator's adaptability to a particular type of hardware, the ease of use of one system vs. others, comfort levels associated with using a given set of hardware and so on.

This is an important issue; both experience and research indicate the weakest link in almost any automated system is the point where human interaction takes place. To protect its investment and to ensure the maximum levels of productivity, an organization most certainly will want to choose a WP system that operators can use effectively.

The group charged with evaluating WP alternatives and making specific recommendations should therefore include one or more individuals responsible for the ongoing WP operation. Also, to ensure proper management attention, at least one manager or executive should be a member of the evaluation/selection committee.

Needless to say, these individuals should have a realistic assessment of where and how WP technology can be applied within both their respective areas and the organization as a whole.

Like any new technology being introduced into an organization, WP has the potential for misuse, or, at least, ineffective use. For example, there is an almost universal tendency to put "everything" on the new WP system, regardless of its suitability, applicability or the economic considerations involved.

Very often, the initial application selected for implementation is much too large or complex for effective management or project control. As a result, the learning curve associated with WP becomes excessively long and creates an unnecessary level of operator and user department frustration. Project completion is delayed because the time required for the system to become operational has been inad-

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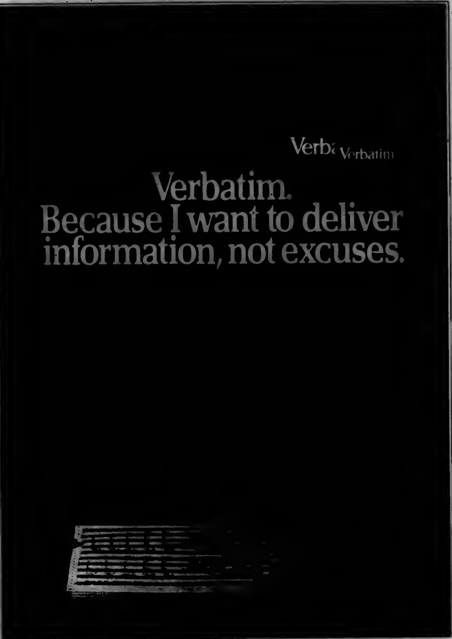

## IBM, WANG, XEROX

*When IBM, Wang Laboratories, Inc. and Xerox Corp. make a move, everyone watches to see which direction they take. What do top executives in these big three companies think about the industry, the technology and each other? John Cunningham (executive vice-president of Wang Labs); Donald Massaro (executive vice-president of Xerox's Office Products Division); and IBM executives David Hanna (vice-president of General and Office Systems Marketing in the National Accounts Division) and Leonard Liu (vice-president of Office Systems, Communication Products Division) shared their views with* Computerworld *OA's editor, Ann Dooley, about the issues they confront.*

IBM, Wang and Xerox are currently jockeying for position as the No. 1 office automation vendor; each presents itself as the company on the leading edge of technology in the burgeoning office automation (OA) industry.

Intent on the same goal, the three vendors have chosen to approach the market from different directions. Not surprisingly, IBM is employing a hierarchical system architecture, mainframe-based approach, while Wang and Xerox have adopted a bus network approach. Xerox, with its Ethernet, is betting on the success of a narrow bandwidth baseband structure, asssuming that many office functions will use their own dedicated communications media; Wang is trading on a broadband, CATV-like cable with sufficient capacity for a total integrated system. Although they might not admit it, the vendors themselves are feeling their way in this new marketplace.

# The Big 3

# WANG

Wang parlayed an early lead in WP systems into spectacular growth and dominance of the market for large, shared WP systems. In contrast with Big Blue's hierarchical approach, Wang's integration philosophy rests on its six-technologies strategy of word, data, image, audio, networking and human factors with Wangnet, its local-area network, acting as the multiproduct link.

Wang has come out as the most outspoken advocate of an integrated office systems package. Although some of its products are still in the development phase and others need further integration, it is working hard to shed its past image of being merely a WP vendor and to become known as an office systems company instead. Wang, however, must control its rapid growth, while continuing new product development and shipment.

> ***"If major companies aren't spending tens of millions of dollars in the next 10 to 15 years, their competitors are going to blow them out of the water." — Wang's Cunningham on the market.***

John Cunningham, executive vice-president of Wang, shared these thoughts:

**The Future:**

"If major companies aren't spending tens of millions of dollars in the next 10 to 15 years, their competitors are going to blow them out of the water.

"But, if people are right on the size of the OA business it will be $15 billion annually by 1990. The growth will depend largely on IBM. If IBM doesn't get its act together, it will never be a $15 billion business because nobody else can drive it the way a company the size of IBM can."

**On Wang:**

"We take a systems approach, not an office products approach. Five years from now, IBM could have the bulk of the plain vanilla products. Our business will require us to stay further ahead on the integration of newer functions, and we'll have a good chunk of that business. Right now, we have a two-year lead with the local networking product being a key product for us in the '85/'86 timeframe.

"Our strategies have to be dependent on IBM's not messing up. If they do, it gives us more time to get bigger and gain market share again. IBM will take the computer approach with a certain set of biases and AT&T will have the communications approach. Wang can look at the best parts of both voice and DP and squeeze in between them."

**The Competition:**

"IBM is the organization we're basically concerned about. We're far ahead of them on product, but IBM is one of the few companies that has all the necessary corporate capabilities. Other than that, we watch people, although there aren't a lot who are doing anything that makes us awfully concerned.

"I think Xerox has real problems because the systems orientation of the company is not good. They're a great 'stamp'em out boxes, support'em services' and marketing organization. Ethernet was a great idea when it started, but should have been broadened to include other office functions. I'll put it this way: At my age, I wouldn't want to have my retirement money in Xerox stock, although I wouldn't mind having it in IBM or AT&T stock."

**Service and Support:**

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## THE SIX KEY ELEMENTS OF INFORMATION MANAGEMENT.

All offices create, revise, communicate, store, retrieve and use information in all its forms to make decisions. CEO has taken these processes, enhanced them and integrated them with Data General's data processing and communication capabilities.

The result is an easy-to-use system that works the way offices work—in all of its six basic information management functions.

CEO WORD PROCESSING incorporates all standard word processing functions, from simple editing to global search and replace. A special view mode lets users preview documents on the display in the format in which they'll be printed. It offers annotation and index functions, and a unique placemark feature that lets users mark places in a document for future reference. There's also an optional 75,000-word spelling verification facility.

CEO ELECTRONIC MAIL lets users create and distribute messages locally or remotely. Users can identify themselves by name, title, or any alias chosen. "Memorial" aliases are maintained to identify employees who are no longer on the system. And "E" mail includes features like certification that mail has been received by the intended party and provisions for urgency through a blinker on the display message counter.

CEO ELECTRONIC FILING files the way you file. Each document has a folder. Each folder has a drawer. Each drawer has a cabinet. (And there's an unlimited number of each.) To locate a document there's a multi-level search facility that classifies contents by subject, date, name or other predefined keywords. And there's even a customizable electronic janitor to empty the electronic wastebasket.

CEO ADMINISTRATIVE SUPPORT lets users maintain their own calendars electronically. It schedules meetings, those involving both personal and company resources (e.g., scheduling conference rooms or the company jet). It also lets you take phone messages on the screen in the familiar "While You Were Out" slips you now use, and performs other administrative functions.

CEO DECISION SUPPORT combines Data General graphics and PRESENT™ software. Through PRESENT, managers and professionals can use non-procedural commands to request information from a DG/DBMS database. The PRESENT facility has relational-like capabilities that let users select, project and join information in databases to perform queries not considered when the database was initially designed. It provides the user with computing, interactive query, report writing and comprehensive office graphics capability.

INTEGRATED DDP. The CEO system is compatible with ECLIPSE® 16-bit and 32-bit information systems. It is also fully integrated with Data General's AOS and AOS/VS operating systems. In fact, all of our powerful DDP products —including application-transparent X.25 Networking, IBM SNA-compatible communications, local area networking, CODASYL-compliant DG/DBMS, and the four most popular ANSI-standard languages—can work in conjunction with CEO systems.

## A SYSTEM THAT WORKS THE WAY OFFICE WORKERS WORK.

CEO also offers an exclusive "Interrupt" feature that lets users put a given job on hold, attend to something else and then return to it without disruption. A "Help" button provides users with simple operating assistance when needed. CEO may be customized to fit the existing structures and practices of your company—by individual, department, or the entire organization. And the Comprehensive Electronic Office has ample provisions for system security, allowing you to restrict access to the system to those whom you designate.

In other words, the CEO system has taken the basic office process and emulated, enhanced and integrated it with our distributed data processing capability. The result is a system perfectly congruent with existing office structures—and easily accessible to executives, managers, professionals and support personnel.

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CEO has a distinct advantage over many previously announced Office of the Future offerings:
It exists.

CEO is a system designed from the ground up—one that's ready for delivery now. Hardware, software, international service and support are already in place. Which is always reassuring to know before you write any computer company's name on an RFP letter.

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If you're interested in more information on office automation, we'd be happy to supply you with further details. Just write to "CEO" 7, Data General, 4400 Computer Drive, Westboro, Massachusetts 01580.

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  - Los Angeles
  - Oakland
  - Palo Alto
  - Riverside
  - Sacramento
  - San Diego
  - San Francisco
  - Santa Ana
  - Santa Barbara
  - Van Nuys
- CO: Colorado Springs
  - Denver
- CT: North Branford
  - Norwalk
- FL: Ft. Lauderdale
  - Orlando
  - Tampa
- GA: Norcross
- IA: Bettendorf
  - Des Moines
- ID: Boise
- IL: Arlington Heights
  - Champaign
  - Chicago
  - Rockford
  - Peoria
- IN: Indianapolis
- KY: Louisville
- LA: Baton Rouge
  - Metairie
- MA: Cambridge
  - Wellesley
  - West Springfield
  - Worcester
- MD: Baltimore
- ME: Portland
- MI: Grand Rapids
  - Southfield
- MN: Richfield
- MO: Creve Coeur
  - Kansas City
- MS: Jackson
- MT: Billings
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  - Somerset
  - Wayne
- NM: Albuquerque
- NV: Reno
- NY: Buffalo
  - Lake Success
  - Latham
  - Liverpool
  - Melville
  - New York City
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  - White Plains
- OH: Brooklyn Heights
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  - Columbus
  - Dayton
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  - Tulsa
- OR: Lake Oswego
- PA: Blue Bell
  - Lancaster
  - Philadelphia
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- RI: Providence
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- TX: Austin
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  - Richmond
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- ISRAEL:
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  - Amman
- KUWAIT:
  - Kuwait
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  - Beirut
- MOROCCO:
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  - Jeddah
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  - Johannesburg
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- INDIA:
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  - Jakarta Pusat
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  - Hiroshima
  - Nagoya
  - Osaka
  - Tokyo
  - Tsukuba
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We've added 1,200 people in field engineering this year, after adding 1,000 last year.

"We recognize that we had problems, but they went back two years ago and were based on a poor job of mixing capital investments and people, compounded by an inventory problem with print wheels. If you buy a $50,000 system and can't get a $20 print wheel, you're not happy"

**Products:**

"In the '80s, image processor bit map displays will be incorporated throughout most systems. Laser printers will come in and voice and other capabilities will fall out of Wangnet. For the next few years, we're basically supporting the OIS systems and other bread-and-butter technologies: Wang hasn't decided what it's going to do about private branch exchange. I don't think it will design its own, but it's not incompatible with what we have now. Broadband local-area networks will do away with the narrower baseband approach. In the near term, the first Wangnet pilot will be in place by early 1982, and 15 beta sites will be in by the end of June 30, 1982.

## XEROX

Xerox has already established a presence in many of the emerging office technologies and was also the first of the three — IBM still has made no announcement — to provide a local-area network. Ethernet, a subject of intense controversy, is intended by Xerox to allow independent devices to interconnect with one another. Xerox's office integration strategy is to operate in a multivendor environment, which it believes is common to large offices.

Although establishing this interrelationship and also developing its own line of products, Xerox has less of a WP installed base than the other two vendors.

Donald Massaro, executive vice-president of Xerox's Office Products Division, commented as follows:

**The Market:**

"Until now, everyone's been selling futures — not what they can deliver now, but what they promise to deliver — and users are holding off because of it.

"For the near term, we don't see one ubiquitous workstation sitting on everyone's desk. Maybe in 10 years, when cost comes down and acceptance goes up, that may occur. A whole variety of standalone products such as electronic typewriters or personal computers will be connected at that time to the communications network. People are looking for a system that is easy to use. They are concerned that the initial attempts at automation are going to have the same kind of flavor that occurred with the secretary, and that would be a disaster because there are a lot more bucks involved."

> ***"The opera's not over until the fat lady sings. We're just in the start-up phase and a lot of people have committed themselves to it, which is more than can be said for Wangnet or any other local networks." — Xerox' Massaro on Ethernet.***

**On Xerox:**

"Approximately 75% of the company's revenues comes from its copiers. While Xerox isn't changing its business, it is changing its approach. In the next five to six years, Xerox will have closer to a 50:50 ratio of reprographics to office automation products.

"We're not interested in the word processing market per se. WP will not be the driving force in office automation. The professional productivity market will be the driver, and that's the market we're after. Xerox has to play catch-up in the area of selling total applications, as opposed to stand-alone boxes."

**The Competition:**

"Wang is a very fine company, but it finds itself outblocked for the first time. Wang has always been the fastest with the mostest and it's finding itself behind the eight ball now. AT&T will take a major portion of the marketplace. It won't happen in the near term, since it will take a while to turn things around and AT&T has to learn how to compete.

"It's not a thing I worry about now, not like I worry about IBM or Wang. Any others that I worry about? I worry about everyone."

**Sales Staff:**

"The whole sales force is going to begin selling the entire product line, starting out with electronic typewriters so they can learn and work their way up to a word processor and then tie it into a network. There's going to be a transition, but we're basically in the same playing field — we're just changing some of our plays. In service, we're already firmly implanted in the office, not the DP room like other vendors."

**DP Strength:**

"I don't think that's important so long as we tie in with DP. Workers don't need a Cobol-type processor machine, they want multifunction devices that can access a mainframe and format it for OA uses."

**Ethernet:**

"We've caught most of our competitors with their pants down in terms of bringing a local network to the marketplace. Approximately 100 networks are installed in outside sites and the sales force has only just been turned loose on the field. That's why the competition is throwing sand in the air about baseband vs. broadband.

"Two years ago, our biggest problem was that nobody used to take a shot at us — now everybody is. If I was trying to reposition my company in the market, I would do the same thing. Show me what broadband can do that baseband can't and justify the cost differential.

"The opera's not over until the fat lady sings. We're just in the startup phase, and a lot of people have committed themselves to it, which is more than can be said for Wangnet or any other local networks."

## IBM

IBM is working to overcome its diverse and sometimes incompatible product line. Prior to the settlement of its long-standing lawsuit and the readjustment of its marketing philosophy, IBM was a much more segmented company. Its recent reorganization marks a shift in marketing strategy, which enables its salesforce to sell its entire product line to all customers. IBM's comments:

**The Market:**

Nothing will happen overnight, David Hanna, vice-president of general and office systems marketing in the National Accounts Division stated. "It's an evolutionary process linking computers and word processing, managers and administrative support people, local files and corporate data bases and diverse information from such sources as voice, image, data and text into a cohesive system."

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**The System for the Enterprise:**

"IBM has committed itself to a plan for developing office systems that go beyond WP and DP to provide an organizationwide information link that IBM calls its System for the Enterprise.

"The system will consist of diverse products that will address a variety of equipment from different users, and the thread that ties them together will be electronic information — information that can be put into the system once, then moved and used throughout the organization again and again.

"IBM products integrate office systems with DP communications in the System for the Enterprise. Over the past 10 years, we have been creating a broad software base that includes information management; communications management; document handling, storage and retrieval; security; and personal computing services, so that we have a substantial headstart. Future enhancements will be developed, but the base is already in place."

> ***"At a given point in time, any one of a great number of vendors may have a technological advantage in a particular area or product. The real sticking point comes when you try to put a number of these different products together to form a system." — IBM'S Liu on the future.***

**The Industry:**

Only recently have the declining costs of technology enabled processing power to be put in the hands of almost every white-collar worker, stated Leonard Liu, vice-president, Office Systems, IBM Communication Product Division. "Today, there are about 48 white-collar workers per terminal. By 1986, the ratio will have shrunk to 10 white-collar workers per terminal. The System for the Enterprise won't improve productivity if some people don't want to use it.

"Work habits vary tremendously. Some people are reluctant to use a keyboard, while others dislike dictating into a machine. The interaction between individuals and machines should be a partnership, not a contest or a struggle."

**Future Technology:**

"The personal workstation, telephones used in message switching and voice annotation of text documents, access to information controlled by authorization codes and voice recognition signature verification all may be technologies that could develop into common usage.

"Voice and data have the potential to become intermixed; personal electronic files may replace file drawers; and personal administrative supports such as dictionaries, text evaluation aids, calendars and tickler files may all be integrated. A professional's workstation may take dictation, answer the telephone, voice or data messages, sort mail, make copies, file documents and schedule reservations.

"These all may become part of what IBM is calling its System for the Enterprise, although a timeframe for such a system is not set.

"Teleconferencing equipment may also become commonplace. IBM has a number of teleconference centers in place, and in one year we have saved more than $8,000 in travel cost alone, not to mention the executive time gained," IBM said.

"For the workstation, IBM is experimenting with better, more efficient terminals and printers. Color display and graphics capabilities will be further improved. Gas permeable displays will have large screens that can show several images at once. IBM is exploring other technologies to raise the printing rate while lowering the cost."

**The Competition:**

Although IBM chose not to comment on specific competitors, Liu noted that "at a given point in time, any one of a great number of vendors may have a technological advantage in a particular area or product. The real sticking point comes, however, when you try to put a number of these different products together to form a system," he said. OA

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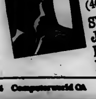

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## COPING WITHOUT STANDARDS

# A Question of Compatibility

The lack of standards and network compatibility in the developing office automation (OA) market all too often leaves the OA user in a quandary over selecting a system:

Users must grapple with issues of whether to standardize on one or more vendors within a particular data or word processing environment and, if so, whether to standardize in remote sites as well. They must then determine how these decisions will change, for better or worse, when a formal set of standards is established.

We surveyed users, vendors and consultants to determine how they were handling the issues, what shortcuts they had evolved and what they thought were the best ways to approach the problems of a particular installation.

Three primary areas emerged as needing standardization: facsimile, word processing equipment and data processing equipment. For the most part, the issues involving facsimile transmission have been resolved with the widely used international CCITT group classifications, which were formally adopted in Geneva in November 1980. These group classifications allow

Illustration by Tim Sullivan

### BY MELODY JOHNSON

different vendors' facsimile terminals to converse in the international language of the CCITT protocols by identifying themselves; synchronizing speed; acknowledging transmission; and printing out the hard copy of the data, text or images transmitted.

However, this is not the case with the text and DP systems, particularly in the U.S., which has the heaviest installed base of WP and DP systems in the world. Several reasons immediately surfaced for the lack of standardization in these areas:

- For the past 20 years or so, a vendor did not benefit from providing compatibility with another vendor's equipment, with the exception of IBM compatibility. IBM, enjoying the incumbent position as supplier of the largest installed base of mainframe computers, certainly was not about to promote standardization. However, in good faith, it could not totally stave off some incursions by the plug-compatible vendors or vendors that chose to cherry-pick IBM networks by providing compatibility through standard IBM protocols such as 2780 or 3780.

Moreover, why should a vendor such as Wang Laboratories, Inc. change from its proprietary position to allow WP vendors to communicate with its massive base of shared-resource WP systems?

The vendors' answer to standardization was to have "our" equipment at all the communications sites, and what is all this big fuss about anyway?

Size has not been the sole determinant in the standardization stonewall; the small vendors also wanted to leverage their installed base by tying users into communicating networks of their products — even if this meant opening offices in remote locations in order to secure a national account order.

- The users have not been insistant enough in pushing for standardization, mainly because they were unclear about the proper channels to take to force vendors to a meeting of the minds.

- Only recently has the inordinate amount of publicity given to the local-area network controversy (the "battling of the network stars" including IBM, Xerox Corp. (Ethernet), Wang (Wangnet) and Datapoint Corp. (Arc) among others) brought the issue to the surface. Multinational companies are becoming increasingly frustrated as they distribute processing to remote branch locations and international territories. Their choices were few and far between; vendor lock-in became a way of life for these companies.

Short-term problems have narrowed vendor selection. "Many of our clients are facing important decisions regarding their network structure. Because there is no truly compatible offering, users feel 'locked in' to a single vendor and product line when they would prefer not to be. The difficulties in communicating from one system to another are overwhelming. Eventually, we will have to standardize one or more compatible networks, but right now the marketplace is in chaos," said Randy Goldfield, president of Gibbs Consulting Group, a division of Katharine Gibbs School, Inc.

Consultants like Goldfield have perhaps been exposed to the most broadly based problems of the user, and her sentiments were echoed by others. Jerry Eisen, president of Office Sciences International, also commented on problems regarding standardization. The user has to "suboptimize" his installation because of the lack of standards, particularly as the usage or product line grows broader, Eisen maintained. And the problems don't stop at trying to interchange data between two or more vendors; they may bottleneck within a particular vendor's product line.

"For example, the Xerox Ethernet products, like those of many other vendors, are for the most part upward compatible, but not downward," Eisen said. Once again, the user must "make do," adapting people and procedures to fit hardware.

However, Eisen said, users can circumvent the standards problem:

1.) If you are buying from two or more major vendors, the chances are good that someone has built a custom software interface that will adapt the systems. You can usually force the issue with the vendor that is trying to get a foot in the door and have that vendor secure the software.

2.) Whenever possible, standardize on your mainframe vendor, maximizing the installation, service, support and training as much as possible. This approach allows for transparencies that guarantee compatibility.

Users seem to have reached a consensus — particularly those users that for the past few years have been forced to deal with the lack of a standard protocol on an international basis. "We have felt

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it necessary to standardize with one or a very small number of selected vendors on a worldwide basis. The network is critical to our operations, and the communications protocols demand standardization," said Jack Walsh, who manages the computer operations at the New York-based headquarters of the multinational corporation, Avon Products. That firm has standardized primarily on four IBM protocols, the asynchronous 2741, and the bisynchronous 2780, 3780 and 2770.

In the WP area, Avon also found it necessary to standardize on a small number of vendors, but for somewhat different reasons. "We have found that by standardizing on a single or few vendors, we not only eliminate the problem of standardization at least temporarily, but also leverage all our dealings and negotiations with the vendor."

Avon found that many remote locations were encountering the same problems. To maximize equipment usage, Avon established formalized training and procedures, which were extended to include software applications and solutions that can be used worldwide. All software development is done at the New York corporate headquarters by a fairly small staff. Through this structure, problems common to all sites can be alleviated. We found this solution to be the most common way users coped with the lack of standards.

The problem of vendor "lock-in" is very pervasive, particularly among larger users. This does not bode well for smaller vendors or for those trying to obtain a smaller piece of the action from a very large account.

However, it severely stymies a user that does standardize; they lose a tremendous amount of flexibility. Users cited examples of preferring a certain company's distributed processing system, but found that while it was compatible with the mainframe shop, was not compatible with the office systems. In other cases, users wanted to use some of the lower cost Japanese peripherals now becoming available, but they were unable to do so because of a lack of compatibility, particularly in the office systems/WP areas.

In addition, there are so few users at this point of the more sophisticated products — such as the Xerox Star, laser printers, facsimile and integrated data/text processing systems — that problems may exist which are not even evident at this time.

Although the problems just discussed do sometimes seem insurmountable, or, at best, extremely expensive and/or limiting, some solutions could be just around the corner.

The release of AT&T into the marketplace could change the complexion of things dramatically. AT&T's Advanced Communications Service (ACS) promises direct communications not only between a very diverse set of products on a multilocation basis, but also among a variable set of vendors as well.

Xerox promises the same opportunities in a local environment through its Ethernet system. The IEEE promises to establish some type of standards for the diverse range of communications architectures available — a real solution for the user . . . or will it be?

***Currently, the best advice seems to be from those who have grappled with the problem already — whenever possible, stick with the equipment from your mainframe vendor.***

To bulwark the positions of the vendors mentioned above, other vendors are loading up their bags of tricks. The most outstanding example is Wang's Wangnet, which will allow the integration of data, text, image, voice and video within a single network environment, but primarily with Wang products. The user is left in a quandary as to which way to proceed, as user needs and budgets expand and time horizons for decision making contract.

For the small user, this problem may not be a major consideration, particularly if communicating between different locations is not required. The major factors are vendor incompatibility as a product line evolves or becomes broader, or as the user becomes larger and needs to upgrade the site. But otherwise, the user is fairly free to find the equipment that best fits his needs and can live happily ever after.

The larger user, however, has probably been burned once and is twice shy in examining the price and performance tradeoffs of a single vs. multivendor site and network performance in a planning mode. Currently, the best advice seems to be from those who have grappled with the problem already — whenever possible, stick with the equipment from your mainframe vendor.

IBM and NCR Corp. have the most expansive product line that includes OA, and Honeywell, Inc. is expected to announce a major OA line soon. It is imperative for these vendors to provide office automation services on their products, primarily to thwart the incursions of office system vendors against their installed bases.

The same strategy applies to minicomputer companies such as Digital Equipment Corp., Data General Corp. and Hewlett-Packard Co., all of which have announced OA offerings recently. Due to the tremendously high costs associated with developing the software to link incompatible systems, a buyer would do well to find out if any other users have already developed this software. If so, do your best to beg or borrow the programming!

The issue of IEEE standardization is a tricky one, with the time factor still being the biggest obstacle. Because of the possibility of potential customers delaying purchase decisions over the IEEE standard, Xerox recently announced it would make Ethernet compatible with one of the IEEE standards, thus resolving the conflict between the two entities and easing the minds of Xerox users everywhere.

To access the potential of the networks offered, a user must establish some priorities, including:

1) Decide what technologies you want on a single network. What might be right for one company may not be right for another — if you recently installed an expensive PBX you may not need voice capabilities on the local network.

2) Determine the importance of the mainframe environment in the overall picture. If the office systems will rarely "talk" to the mainframes, you may not need to be so conscious of maintaining compatibility between the two.

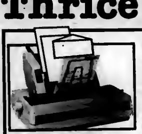
3) If electronic mail is in the picture, look at all the options. Several companies offer a service that may be more time- and cost-effective than putting the software on current systems or establishing a separate system through word processors or other terminal-based products.

4) For the most part, local networks can cost-justify themselves with a fairly short payback period, normally three to four years. Since the example has been set that everything takes at least twice as long as originally expected, taking the plunge now and getting a year or two of expertise under your belt could be very beneficial.

5) Most vendors respond to pressure; the wide offerings in communications protocol options over the past year were primarily due to intensive pressure from users. In addition, users should share ideas and solutions with other users through their respective user groups. OA

*Johnson is a technology analyst at Kidder, Peabody & Co., New York, for the office systems companies.*

Thrice is Nice



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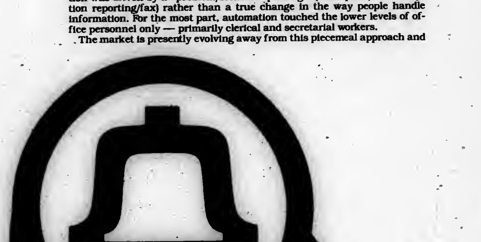
### AT&T DEREGULATES

# There's a New Kid On the Block

The 1982 AT&T Consent Decree, coupled with the Federal Communications Commission's (FCC) Second Computer Inquiry, sets the stage for AT&T's office automation challenge. Bell's Fully Separate Subsidiary (sometimes called Baby Bell or Bell Unregulated Subsidiary) could become an influential factor — competing for market share with IBM, Japanese vendors, Digital Equipment Corp. and others. A look at the unfolding office systems market will indicate some of the strategies that will be critical determinants of the timing, approach and success of Bell's attack on the office.

The office automation (OA) marketplace over the last 10 years has been driven primarily by "piecemeal" solutions. The success of Wang Laboratories, Inc., for example, stemmed from shared-logic word processing — a narrowly targeted technology for use by a limited stratum of the office population. IBM dominated in another niche, electric and electronic typing, while Xerox Corp. provided facsimile devices and copiers. Office automation was driven by a "problem/solution" paradigm (boilerplate/WP, exception reporting/fax) rather than a true change in the way people handle information. For the most part, automation touched the lower levels of office personnel only — primarily clerical and secretarial workers.

The market is presently evolving away from this piecemeal approach and



## BY GEORGE F. COLONY

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Suddenly, every computer company seems to have two new words in its vocabulary: office automation.

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Today, we can make everyone in your office more productive. From the chairman of the board to the person on the switchboard.

So no matter how many computer companies start talking about office automation, just remember:

The office automation computer company is Wang.

**WANG**

**The Office Automation Computer Company**

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toward the systems sale. Vendors are beginning to build full office environments — supplying all types of information handling — dictation, DP, interactive voice, communications, WP, graphics, output and so on.

OA can be divided into five systems approach segments, which vendors must provide users in the future:

**1. Communications Processing:** Gateway to the outside world — to other local networks, leased/dial-up lines, interface with standard protocols including 2741 and TWX/Telex asynch; 2780, 3780, 3270 bisynch; X.25; and IBM SNA/SDLC. All information bound off-net would be handled at Segment 1. This machine will likely be a private branch exchange/integrated office controller in the future.

**2. Utility Processing:** An applications box in the office, the utility processor most closely resembles a minicomputer (for example, the IBM 4300 or Wang VS). Local applications would be developed, stored and distributed from this point to Segment 5 user workstations. The utility processor's importance lies in its bridging between the central DP facility above and the local network/user workstation below.

**3. Advanced Peripheral:** These shared, high-capacity devices include nonimpact printers, image/text processors, voice-store-and-forward mailboxes, omnifont optical character recognition, backup and easy-access storage.

**4. The Local Network:** The backbone of the automated office, the local network must offer low cost/connect, cost-justifiable wiring/topology, easy attachment of systems, ability to handle all office applications (including voice in the near term) highly dependable transmission.

**5. The User Workstation:** This segment defines the multifunctional, software-based, powerful desktop machines that will perform most of the true processing in office systems. These generic engines will be defined by applications as down-line loaded from the utility processor rather than by a specific architecture or avowed function (the terms word processor, very small business computer or personal computer will be meaningless). Because applications synergy between the utility processor, the user workstation and the centralized corporate host will be very important, architectural compatibility through the three levels may be imperative.

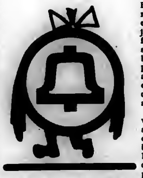
Users will probably opt for a single vendor for all of their office system if it is workable, cost-justifiable and integrates well with existing distributed data processing networks/hosts. For companies below the Fortune 1000 level, pieces of this type will be run in-house, with additional functionality (utility processing) handled by a systems house/service bureau.

This then is the environment within which AT&T must market its OA products via the Fully Separate Subsidiary.

Computer Inquiry II, a 1980 ruling of the FCC, mandated AT&T's entrance into computer/office automation activities through an unregulated subsidiary, held at arms length. This entity, which we shall call Bell Information Systems, is now being formed within AT&T. It will offer two general areas of business: user equipment, which is referred to as customer premise equipment, and interfacility communications processing, referred to as enhanced services.

Important factors dictated by Computer Inquiry II which will govern the initial shape and configuration of Bell Information Systems include:

- Research and Development capabilities. Under the terms of the 1982 Consent Decree, Bell Labs will be left intact within AT&T and Bell Information Systems. Computer Inquiry II specified that the "systems-oriented" portion of Bell Labs will be split to go with the subsidiary. Hence, the part of Bell Labs that is engaged in building computer systems, private branch exchanges, systems software, terminals and peripheral devices would become the research and development wing of the informations systems unit. Yet Bell Labs' research in so-called common technology, which includes semiconductors, displays, microprocessors, keyboards, rotating and solid-state memory would stay with the regulated AT&T.
- Manufacturing capabilities. The portion of Western Electric which is engaged in manufacturing systems would be split off as a part of Bell Information Systems. The building of components would stay with Western Electric/AT&T.
- AT&T/Bell Information Systems relations. Because of the arm's length subsidiary relationship with AT&T, synergy between the two corporations will be qualified. Computer Inquiry II specified only one aspect of the arm's length relations — all technology that flows from Bell Labs/AT&T to Bell Information Systems must be publically offered.



In addition, I believe transactions between the two entities must resemble transactions between fully separate corporations — buying must be conducted on a bid basis, with full invoicing of orders. No favorable pricing will be allowed. While AT&T will own Bell Information Systems (probably listed as an unconsolidated entity on the parent company's balance sheet), most synergy will be limited to strategic direction rather than tactical management.

The 1982 Consent Decree will have the following impact vis a vis the subsidiary:

- It sweeps away the 1956 Consent Decree, which restricted AT&T to communications — keeping it out of computers, office automation and so on.
- It will give Bell Labs sole rights to its patents — the 1956 judgment specified that the research entity had to make all patents available to other companies under licensing arrangements.
- The decision will result in a streamlined company, unburdened by the less profitable operating companies. This will bode well for the capitalization of the subsidiary — in effect, making additional monies available for investment in new business.
- It restricts the Bell operating companies to provide interfacility wiring only — keeping them out of the customer premises equipment market. Thus, there will be only one "phone" entity offering telephones, word processing and computing — Bell Information Systems.

I believe Bell will bring the following devices to market in its battle to win the office systems battle:

In communications processing: Antelope (digital PBX), Advanced Communications Service (out of house).

In utility processing: the 32-bit Unix Engine.

In advanced peripherals: not yet predictable.

In local networks: existing twisted pair (short term) and high-speed data bus (long term).

The central strategic product for the subsidiary in selling office systems to large organizations Fortune 1000, large insurance companies and banks) will be its utility processor. It will have to deal early on with IBM's virtual hegemony at these large corporations' central DP facilities; 65% to 70% of which have already standardized on the IBM 370 and 55% to 60% of which will be running SNA/SDLC by yearend 1984, indicating a hard commitment to the IBM solution.

Communications between office environments and the central facility (for corporate data base access, or general request for information) will be a crucial function of the utility processor. Hence, the subsidiary's entry at Segment 2 must offer some type of bridge to full SNA/SDLC (for communications) and to the Document Interchange Architecture (for file format compatibility).

While Bell Information Systems must initially live with this subjugated role, a larger battle will certainly loom. Competition for not only the office but also the corporate host will turn on the war of the operating systems — 370 OS vs. Unix. While Unix stands no chance of making a blitzkrieg on the 370 (due to the astronomical investment in applications and systems software), it could slowly make inroads via the office. Standardization at this level (helped by a good bridge to IBM above) could begin to build the grass roots movement away from the difficult to use IBM procedures and accumulated software.

The Unix advantages include its probability — an important feature given the future sharing of applications between user workstations and the utility processor. Bell Labs has already developed a 32-bit microprocessor, the Belmac 32, which could become the heart of the low-cost, multifunctional Bell Information Systems advanced user workstation running under Unix.

Unix represents an excellent unifying force for the Bell Information System's full office system. Unlike IBM or Xerox, which are presently plagued by the proliferation of different operating systems and architectures among their personal computers and word processors (thus restricting interdevice communications), Bell can organize its effort around a single system. Unix is becoming somewhat of a standard operating system for the advanced 16-bit microprocessors such as the Motorola Semiconductor Corp. 68000 and Texas Instruments, Inc.'s 99000. Given large-scale installation of systems based on these micros (the TRS-80 16, the Apple IV, the Apollo Domain), Bell may offer the integration of a number of existing machines in office environments. Finally, third-party Unix systems houses are currently proliferating in anticipation of the AT&T push for the operating system. These third parties will provide important second sourcing, applications and general support for Bell Information System's binding force.

An important weapon which will undoubtedly be used in the Unix vs. 370 war will be the Advanced Communication Service (ACS). By dominating interfacility transmission — communications between office automation pools and corporate hosts — with ACS, the IBM to Unix conversion could be handled out of house. This would be a painless means for users to migrate to Bell Information Systems/Unix locally while retaining IBM in traditional areas like centralized computing. The user would not have to implement local bridges — all bridging would be performed transparently by the AT&T value-added network.

Segment 4, the Local Network,

could represent an important Bell advantage over its OA competitors. Under the terms of the 1982 Consent Decree, AT&T will own all customer premises equipment — including the twisted pair which already runs to most company desktops in the U.S. While Wang Laboratories, Xerox and others must convince potential users to rewire buildings with coaxial cable (at high per foot cost) to implement office communications, Bell could offer equivalent service through extant building wiring. Indeed, AT&T's solution will give users data plus interactive voice — a feature that can be added to Ethernet, Wangnet and other bus-based systems only at prohibitively high costs.

Use of the existing pairs for digital voice and data will put responsibility for switching in a central "office controller" — a third- or fourth-generation PBX. There are certain disadvantages to this approach, including:

- Overdependence on one device for communications — loss of PBX means a data and voice traffic halt
- Limited available bandwidth of twisted pair — maximum speed of approximately 1M bit/sec.

The initial integrated office controller to be offered by Bell will be the long-awaited digital switch code-named Antelope. Antelope is expected to be a full digital machine, capable of receiving digital or analog information. As an alternative to the emerging bus-based local networks, Antelope may be attractive, with advantages that could include:

- Cost-justification on voice alone — data added at small incremental cost.
- Use of existing wiring.
- Easy interface to ACS, X.25, dial-up, leased lines.

While Bell Information Systems will certainly move to other means of local communications in the long term — Bell Labs holds 40 to 50 patents in token and other bus access technologies — the PBX will give it the best price/performance ratio over other local area net vendors in the short run. As an entrance strategy, it will likely woo the greatest number of users in the shortest possible time.

Indeed, Bell Labs has been at work on a managerial system as part of its executive planning, information and communications system. "Getset," as it is code-named, will give executive personnel true integrated voice/data functionality in a very easy-to-use package. While Xerox, Wang, IBM and others are now offering managerial systems that offer too much power in narrow areas (computing applications) and may intimidate the majority of potential users, Bell will use the ultimate executive tool, the telephone, to wean the uninitiated to automation.

Computer Inquiry II and the 1982 Consent Decree mandate AT&T's office automation entry. As a late-comer to the office systems market, Bell Information Systems will have to employ certain entrance strategies — means of quickly winning market share while coexisting with de facto standards (like IBM's mainframe hegemony). These strategies will include:

- Offering an inexpensive voice/data local network through existing building wiring/Antelope PBX.
- Control over interfacility communications through ACS.
- Offering an excellent bridge to IBM host facilities — either through ACS or through in-house conversion.
- Implementing a standard, portable, user-oriented operating system (Unix) running on most office systems.
- Encouraging third parties to contribute applications and support to Unix — further establishing it as the standard local operating system.
- Giving executives and managers access to information through easy-to-use voice/data systems.
- Offering information processing and communications from one entity — the ultimate solution for eliminating multivendor environments.
- Coming to market with state-of-the-art technology — leveraging Bell Labs' R&D resources.

While these strategies will help speed the subsidiary's status as a market factor, several problems must be overcome, including general marketing weakness compared with IBM and Xerox's and even Wang's up-and-coming marketing team; a lack of advanced peripherals and common technology and R&D capabilities. OA

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*Colony is the director of Office Automation Systems/Implementation Strategies, an OA planning service at The Yankee Group, a market research and consulting firm in Boston.*

TECHNOLOGY:

# *What's on The Horizon?*

**By 1970, most of the major concepts pertaining to the electronic office environment — such as word processing, electronic mail and local networks — had been formulated. But these and other technologies are still undergoing substantial change. Gnostic Concepts, Inc. has looked ahead through the next several years and highlighted some of the major changes in office technology which will have an impact on users of the automated office. The following is a look at some of those major trends.**

**Text Processing**

Added value functions will appear on most systems in the first few years of the decade. Important features of this type will include:

- Spelling checkers. At least seven packages now are being offered on products from IBM, Wang Laboratories, Inc., Lexitron Corp. Radio Shack, Syntrex, Inc., Compucorp and a smaller firm, Greenman-Woodward. Spelling checkers are likely to be particularly useful in installations using optical character recognition (OCR) input, as they permit a higher degree of automated cleanup before the WP operator begins editing operations.

The next logical step for spelling checkers is to supply the most probable correct spellings of a misspelled word, which is also a step toward a semantic analyzer that can suggest the appropriate word where several possibilities exist, based upon the context in which the word appears. The logical processes may also be applicable to direct reduction of voice to text.

- Paper-handling devices, used with impact printers to permit reliable handling and easy changeover of forms. Sheet feeders, in particular, are likely to appear on stand-alone-type WP systems, such as those offered by Lanier Business Products, Inc. Shared-resource types are more likely to retain tractor-feed form handling for the sake of reliability when unattended, although the reliability leaves much to be desired.
- More intelligent OCR input systems, capable of reading multiple fonts, checking spelling and flagging errors, and offering facsimile transmission as an option. The scanners will be able to recognize type style automatically and adjust accordingly and will be able to cope with mixed line spacing and underlines. Some systems may be able to interpret proofreading marks.
- Addition of voice editing. Principals will be able to edit a file by dictating edit instructions in a file which will attach to the text document file. This capability will be prevalent by mid-decade.
- Very portable text processing terminals, already beginning to appear, will increase in capability and will acquire full-page flat panel displays. Liquid crystal or other passive display technology will be preferred because of lower power drain than the plasma panels.
- Continued marriage of functions: the text processing workstation will be able to perform a variety of communication, data manipulation and access functions as well as manipulate text, but the text-intensive workstation will maintain a somewhat unique identity by virtue of human interface features required to optimize the text-related functions. Many WP systems will adopt CP/M or other general-purpose operating systems in order to acquire flexibility and use existing programs. The most commonly desired combination at present is WP and records management, followed by WP and communication, WP and graphics and WP and processing.
- Universal adoption of "command sequences" on text processing equipment, allowing the creation and preservation of specific sequences of operations activated with simple commands.
- Decreasing prices through 1985 for text processing workstations, with annual average decreases in the 5% to 7% range. The availability of a low-cost entry will become a critical need for vendors trying to break into Fortune 1000-type accounts in the next two to three years. Most vendors will offer substantial discounts to firms committing to multiple workstations used in companywide nets.
- Integration of facsimile and textual communications, including conversion from one format to another. This will get off to a slow start, but will be significant by 1985.

**Local Networks:**

The local net has evolved from a low-speed construct based upon twisted-pair wiring into a high-speed, coaxial cable-based implementation. While the current emphasis is on baseband designs operating in the 10M bit/sec region, it is highly likely that these will evolve into broadband nets operating with carriers in the 25 to 40 MHz range. (IBM's pending local net product is expected to fit this latter category.) However, by 1985, fiber-optic technology will begin to appear as a standard local net technology, particularly where information density is high or security or external interference is a major concern.

Both approaches will coexist through 1990, with local fiber-optic interconnections gradually gaining market share. Fiber-optic will become the preferred medium for transmission of rates in excess of 20 MHz because of its relatively low attenuation at high frequency. However, the relatively high

WORD PROCESSING SYSTEM

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costs of components and taps will delay its general acceptance at the local level except where the conditions cited above apply.

### Color CRT Graphics

Starting at the end of 1981, companies competing with IBM in the 3270-compatible market will be introducing 3279-compatible terminals. Most independent companies competing in the Ascii market will have producta announced by the end of 1982, as will many of the firms designing terminals for use with local networks.

In the computer-aided design/computer-aided manufacturing (CAD/CAM) area, a significant market is developing for CAD/CAM capabilities in smaller packages for use in an office environment, rather than as part of a dedicated complex. Most of these products will be announced by late 1982, and will be instrumental in continuing the decline of the average cost of graphics display stations.

### Hard-Copy Developments

By 1980, cameras, pen plotters, ink jet, laser plotters and matrix printers had made themselves plausible solutions to obtaining color hard copy, albeit at unsatisfactory coat or speed in moat cases. Electrostatic color devices may be expected to be in a test marketing phase in the 1984/1985 timeframe. For the time being, however, there is no universally acceptable technique. Each graphics user will have to select the hard-copy technology which is most appropriate. Hard-copy devices will be present, and rather than diminishing, will become and remain desired equipment for the foreseeable future.

### Software Limitations

At present, software is a pacing item in the deployment of graphics. Not only are standards at the applications level missing, but present systems do not provide the nonprocedural interface to the system needed by most managers. Access to both formatting capabilities and the system data base are required. These tools will begin to become available in the 1983/1984 timeframe; their precursors can be seen in the plotting programs such as Tell-A-Graf or EZ-Graf.

### Disk Storage Technology

- During the first half of the decade, improvements will continue to be made in the performance obtainable from particular coatings, some as thin as 25 microinches.
- The use of thin film heads in production equipment has already commenced and will be commonplace by the end of 1982, even in 5¼-inch diameter disk equipment.
- Perpendicular recording will become available by mid-decade on a production basis and will be commonplace by 1990.
- Thin film media is now making its appearance on a few advanced products and will be a standard production technology by mid-decade. It will slowly displace particulate coating in producta baving over 100M byte capacity by 1990. Film media thickness will be in the 2- to 10 microinch range.

The general trends in heads for Winchester technology disk are as follows:

- Decreasing mass and physical size.
- More sophisticated aerodynamic design to stabilize head position.
- Lighter head loading forces; originally 70 to 100 grams, they have decreased to the 10-gram range.
- Use of thin head fabrication techniques.

### Bubble Developments

In the next few years, bubble memories will develop along the following lines:

- Early increase in capacity to 4M byte per device, using Permalloy Chevron propagation patterns. National Semiconductor Corp. discussed such a device at the 1981 intermag conference. Bubble diameter ia 1.5 micrometer. The data rate exceeds 1.5 MHz at a 200 KHz coil frequency. The chip size is 300,000 mil², organized by 8 bits. Delivery in quantity is scheduled for 1982.
- Coilless bubble memories — in the mid-80s, coilless structures will be available, permitting very significant reductions in bubble memory costs. Western Electric Co. has discussed a coilless product and IBM is believed to be working on one. These devices are based on the use of internal current sheets to provide the magnetic fields necessary to drive the device, rather than external coils.
- By 1985, 16M-structures should drive prices per bit at the chip level down to the 6 millicent

ditto

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range. Smaller devices will have prices in the 20 to 25 millicent range.

### PBX Industry

Private branch exchange (PBX) will become a supercontroller in the electronic office environment, providing not only switching capabilities for voice and data traffic, but also an integrating vehicle for such services as electronic mail, facsimile machines, communicating word processors and copying machines, store and forward systems and multimedia teleconferencing systems.

In its role as supercontroller of the office information networks, the PBX industry will face thorough competition from coaxial cable or optical fiber-based local-area networks. Neither technology will completely dominate, but PBX will emerge as the most pervasive of the competing technologies for two reasons: PBX technology is much more mature and almost all end users are already wired for telephone and PBX connections, whereas local-area networks would require wiring buildings again, which will entail large investment expenditures. Accordingly, high-speed local nets will be used where specifically justified, with more heavy use of PBX in most existing structures and general applications. In new construction, however, the local-area network will achieve higher utilization.

The PBX market will show higher growth in smaller size PBX systems, higher growth in southern and western states and increased penetration by services and manufacturing industries, with the major loss in the government sector.

In selecting a PBX system, end users will show increasing emphasis on cost, reliability, expandability, suppliers' credibility and maintenance support, features that enhance personnel productivity, networking capability integration of diversified office systems support, energy consumption and size and weight.

Average price per line will decrease from $670 in 1980 to $560 in 1990 — about 1.8% annually. Integrated function systems will begin at $1,000/line and can be expected to decline at about 3.5% annual average rate throughout the decade.

### Ethernet-Type Nets

The Ethernet type of local network is a possible DP/office communications solution. Another possible evolution is the combination of an integrated DP/office bus-structured network and a separate telephone, PBX, voice network. The legitimacy of this concept is provided by an industry venture linking Xerox Corp., Digital Equipment Corp. and Intel Corp. to provide the component and equipment complement which will set a de facto standard in the industry. If it should succeed, the coaxial cable-based local network (Xerox calls the design Ethernet) would link both DP and office data equipment, and the control element would provide the link to the long-haul data network lines. Unfortunately, the network cannot be easily extended to include large numbers of telephones for a complete integrated voice/office/DP multiplexing concept. A separate voice network linked to the PBX would be required for voice communications. Data features currently being added to PBXs such as Rolm Corp.'s CBX or Northern Telecom Systems Corp.'s SL-1 would be redundant.

There are pro and con arguments to the Ethernet concept. On the pro side is the simplicity of the bus structure with taps for terminal or equipment inputs. A simple interface based on one or two large-scale integration (LSI) chips is all that is required. Also, a wide bandwidth can be made available on any of the connection points. Current bus data rates are in the .10M bit/sec range. On the con side it is noted that coaxial cabling is required. This means that this must be added to the twisted-pair telephone wires that already exist. The wide bandwidth is currently of questionable use, as not all of the spectrum is efficiently used. That is not to say that a bus- or load-structured integrated voice/DP/office communications system cannot be designed, but simply that it is far more complex than the Ethernet concept. In any event, adoption of a broadband local net system concept would address most of these limitations, and the eventual evolution of Ethernet to a multiple channel broadband format is anticipated due to competitive pressures.

### Integrated Voice/DP/Office PBX

The designation of a singular control element for the integration of digitized voice, computer data and office data represents a unified approach that is cost-effective and very functional. Recently Intecom, an Exxon Enterprises company, announced

WE'VE SOLVED A TOUGH TYPESETTING PROBLEM

$$\frac{\sum_{k=1}^{n} A_k}{H} + \frac{\sum_{j=1}^{n} B_j}{K} = \frac{K\sum_{k=1}^{n} A_k + H\sum_{j=1}^{n} B_j}{H \cdot K}$$

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such a design and four or five other companies are known to be well along on similar offerings.

The benefits of this concept are twofold. First, the integration of the transmission for DP data, office data and digitized voice over existing PBX wiring simplifies the installation and provides the necessary ports in the designed location. Second, a single intelligent control element can make efficient use of the long-haul transmission channels where 60% to 75% of the annual communications expenditures are allocated. That is, typically 25% of communications go for equipment and 75% for transmission.

There is no question that a singular, integrated local network for voice, DP and office data is the most desired. The only concern is whether the transition from separate to combined communications can be made in one product generation. The answer appears to be embedded in the cost savings to the end user and the added feature complement.

Of the three alternatives delineated, the integrated voice/data PBX is the most likely to evolve in the next two or three years. The primary reason for this is that it represents the most effective cost savings to the user and yet provides for almost unlimited new feature possibilities. The major cost saving will be derived from effective utilization of the long-haul transmission channels which currently suffer from low data transmission effectiveness. By integrating both voice and data for the long haul, this effect can be minimized as to cost.

On the local network side, the established wiring for local transmission is retained; however, both data and voice can be interconnected to the switch. This eliminates three different transmission networks currently required for separate voice, DP and office data interconnection. Local nets are likely to remain a significant market in applications where there is functional specialization such as documentation generation or document storage/retrieval. These typically involve transmission of long documents at high data rates within a confined area.

Of the remaining two alternatives to the integrated voice/data PBX, the local Ethernet concept ranks second. The biggest problem here is the lack of universal structure. Ethernet is only one design. IBM has its own, the international data standards group has another plan, Zilog, Inc. has a competitive plan called Z-Net, Ungermann-Bass, Inc. has Net/One, Datapoint Corp. has its ARC and Wang has still another. The problem is one of standards and it is unlikely that a consensus will form for a given plan. Even if it does, the voice sector is omitted and in terms of user expenditures this is a minimum of 4 to 1 greater than DP or data expenditures at the present time.

The evolutionary move to an intelligent data switch-based local network is the least desirable because it addresses the smallest market sector. If the top 100 corporations are the target, then perhaps an argument can be made for such a plan. However, in the long term, it will surely be supplanted by an integrated communications approach.

It should be pointed out that the foregoing arguments regarding the available market for the three plans are not mutually exclusive. If the integrated voice/data/PBX approach is taken, the other two have more limited market potential. If either the intelligent data switch approach or the Ethernet approach is followed, the standard voice market remains to be tapped.

## The Future

In the near term, there will be a cautious move toward introduction of voice/data PBXs. The early key players in addition to Intecom, Northern Telecom and Rolm are Datapoint and AT&T. Typically, the codec will be in the telephone set and a minimum of two twisted-wire pairs featuring phantom powering will be utilized. The common equipment will feature a four-wire or six-wire digital switch and several processors will be employed.

Other likely architectures to appear are the loop (ring), folded loop, and modular loop connected designs.

Conceptually, the loop architecture minimizes wiring, eliminates physical line switching, requires extensive LSI for cost-effectiveness and represents an integrated modular design. Any fault around the loop is healed by shunting the return path on either side of the fault to the other concentric loop. Since the loop architecture is new and confusing to some, it is advisable to investigate this architectural concept more thoroughly.♦

OA

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*This article was excerpted from "Description and Evolution of the Electronic Office," The Electronic Office Service, copyright 1981, Gnostic Concepts, Inc., Menlo Park, Calif.*

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MICROS ENTER THE OFFICE

# Getting Personal

The demand for personal computing in business is growing dramatically at all organizational levels. From the staff assistant to the chief executive officer, white-collar workers are seeking the processing capabilities offered by low-cost microprocessor technology. This escalating user demand has been propelled by a mass media advertising blitz and a desire to gain personal access to computing power, both of which have contributed to the increased visibility and explosive growth of the market.

Although the personal computer is a much publicized and popular solution to the office automation (OA) needs of corporate professionals, three important questions often remain unanswered, even after a hardware commitment has been made:

- Who is likely to profit from owning a personal computer?
- What can a personal computer actually do?
- Does the functional power of a personal computer justify its cost?

The answer to the third question varies dramatically with the user's job description, applications requirements and salary level. Answers to the first two questions are more easily managed. Typical desktop computer

### BY THOMAS H. WILLMOTT

configurations include keyboard, CRT, 48K bytes to 64K bytes of main memory and two disk drives, each with the capacity to store approximately 140M bytes of information. The user will also select either a dot matrix or letter quality character printer. Depending upon the choice of printer, hardware equipment costs range from $3,500 to $6,000.

In terms of basic component definition, there is really little difference between Apple Computer, Inc.'s Apple II, a Radio Shack TRS-80 and an IBM 3033 mainframe. Each has a console with keyboard and CRT, main memory, disk storage and printer output options. The point of this rather unlikely comparison is that it takes a particular brand of enthusiasm to manage all the gadgets delivered in a personal computer package. Buying a personal computer means accepting total responsibility for the operation of a number of system elements.

Using the system is relatively easy, and for those who are eager to master the integration of computer devices, today's personal computer systems are delivered with excellent documentation. Some people, however, will find switching diskettes, reading about record lengths, building files and creating screen formats distasteful. The potential personal computer buyer should be made aware that optimum use of any desktop system will require gaining a certain amount of hands-on experience, and this requires rolling up the sleeves and poring over manuals, something a busy executive may not feel inclined to do.

Figure 1. Projected Savings Through Use of Personal Computer

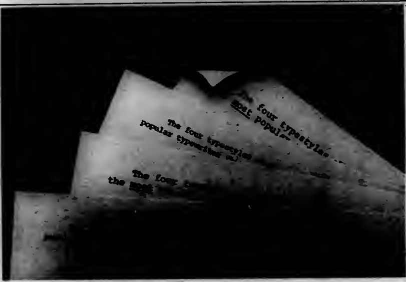
Personal computer owners without significant programming experience must also be willing to accept the limitations of off-the-shelf applications packages. If the user requires the immediate automation of very specific tasks or unique corporate applications, "canned" programs won't be appropriate.

Purchase of any microprocessor-based system must be planned with an eye toward maximizing available software. Apple and Radio Shack, for example, have a sufficient installed base to create a market for literally thousands of independently produced programs. And, more than 2,000 packages are also now ready to run on 8-bit computers supporting the CP/M disk operating system.

The most commonly discussed and widely applicable business software programs are those that automate the spread sheet. Packages such as Visicorp's Visicalc provide a format for analyzing business data and calculating revenue, expense and other budget projections. The concept behind such a program is to offer the user an electronic scratch pad. Although this is hardly a revolutionary idea — computer forecasting packages are not new — every year at budget time, work throughout the corporation grinds to a halt as financial data is gathered, pencils are sharpened and reports are prepared.

Having control over a personal computer is a little like having a convertible on a warm spring afternoon. There is freedom and flexibility to experiment. No staff member need be asked to calculate a dozen or more mathematical alternatives by hand. DP turnaround time is not an issue and the manager who actually manipulates data can learn much from the experience. Computerized "what if" analysis is a powerful, strategic planning option.

A stockbroker or trust officer responsible for portfolio analysis is also a likely candidate for the personal computer. Previously, that person produced a list of securities on the typewriter with laboriously calculated dividend,



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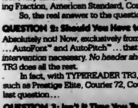

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yield and pricing information. Now the most rudimentary programming logic and print routines will deliver sophisticated documentation of activity on an account on moment's notice. Imagine the impact when a client is handed a portfolio report with today's closing prices.

Although the list of advantages is impressive, there are also a number of disadvantages associated with personal computers. Limited amounts of data storage available on floppy disks pose serious problems for many business applications. Although companies such as Seagate Technology, Inc. and Tandon Magnetics Corp. have entered the micro market, the cost of large-capacity Winchester disk drives is still too high for the typical personal computer user.

Communications capability is also an important concern. Most personal computers do not now have access to mainframe data bases, and this isolates the manager who needs to track corporate data. Communications software is emerging to meet the need. I.E. Systems, Inc. in New Market, N.H., for example, is the exclusive agent for several relatively new programs.

When loaded via diskette, these programs give microprocessors the appearance of either bisynchronous or asynchronous terminals, which allows the inspection of files stored at the host computer.

Even with these enhancements, however, difficulties with compatibility of formats, merging mainframe data with personal computer data and the security of corporate information will still require the technical support of management information systems. In other words, even with a personal computer, the user may still remain dependent on DP expertise, a situation the personal computer was supposed to solve.

A number of important pieces are still missing in the personal computer puzzle. Users are waiting for access to local-area networks, which will provide personal computers with an environment for electronic mail and shared resources, including large-capacity disks and high-speed printers. Networks of intelligent processors will also reduce the cost and improve the quality of full-functioned software applications.

But the popularity of personal computers continues to grow. Giving the line executive or chief executive officer a personal view of sales data prior to an important decision can justify a system's entire price tag. Time saved by automating routine administrative tasks can easily lead to an additional $5,000 sale for the account representative. But what of the more typical employee? Does the functionality of the system justify its cost? Figure 1 demonstrates one possible cost/benefit analysis.

Numbers, words and ideas are the tools of white-collar workers. Investment in electronic support technologies will produce dramatic productivity improvements for our economy. Anticipating application usage and estimating payback periods are two ways to protect the rather substantial dollar investment required to gain personal computing power. Simply put, this power can dramatically increase the productivity of individual employees whose applications are personally or departmentally critical, but fall short of the corporatewide impact required for extensive DP support. **OA**

---

*Willmott is account manager for the Strategies Office System's Client Services at International Data Corp., a market research firm in Framingham, Mass.*

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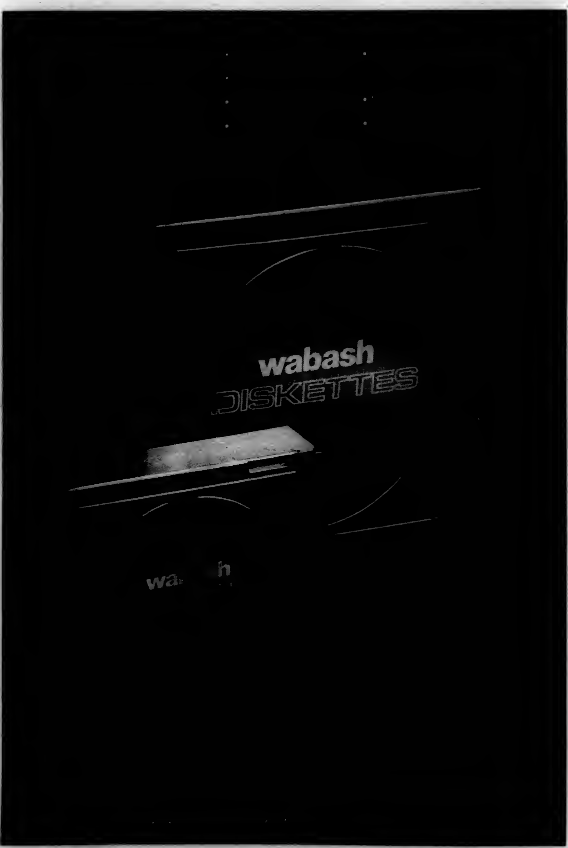
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# Ergonomics

## *The Mental Strain*

The importance of ergonomics cannot be overstated. Over the long term, it means increased market share, higher profits and increased productivity; over the short term, it means a more satisfied user base. Plenty of evidence exists to show that user-unfriendly designs preclude a widespread acceptance of office automation (OA) systems. In the early days, systems implementors could be less attentive to ergonomics because most applications were used by technical and computer-knowledgeable users.

*(Continued on Page 61)*

## *The Physical Pain*

"My shoulders are sore, my back is killing me and I've been staring at the damn tube so long my eyes won't focus right. My boss wants more output now, but I'm afraid to work much faster because I might hit the wrong button and blow the system. I wish they had trained me on this thing for more than three days. As far as I'm concerned, the great 'office of the future' is just a computerized version of the assembly line of the past."

This kind of comment is unfortunately too frequent around certain automated

*(Continued on Page 56)*

Illustration Courtesy FFP Office Environments Ltd.

BY RICHARD KOFFLER

BY MARVIN DAINOFF

offices. Given the groundswell of movement toward office automation (OA), computer-aided design/computer-aided manufacturing (CAD/CAM), robotization and networking of data bases, it is inevitable that a greater fraction of the population will spend a greater fraction of its time at a CRT terminal as information users/manipulators.

In our rush to take advantage of more powerful technology, however, we ignore the user of such technology — frequently to our peril. Fortunately, the movement toward a more humanized work technology is beginning to be taken more seriously. Theory Z, quality of working life and quality circles, are concepts that today's manager cannot avoid thinking about. Ergonomic design falls well within the scope of this movement.

Until recently, ergonomics, has been largely unknown to the general public. As used here, ergonomics refers to the attempt to optimize the interactive relationships between an individual worker and the surrounding work environment. We use the word environment rather broadly here. As applied to OA, we can make three further distinctions:

(1) Ergonomics of equipment and physical surroundings.

(2) Software ergonomics.

(3) Ergonomics of work organization..

I will focus on the first of these areas and provide what I regard as reasonable advice based on current knowledge. It must be clearly understood, however, that there is always an inherent lag in the application of research findings. This is particularly evident in the field of OA, where technological advances tend to progress much faster than our understanding of how to cope with them.

The first area I will explore is glare control and lighting. At one level, the issues are fairly easy to state. The eye functions like a complicated gain-control mechanism; it is adjusting its own level of sensitivity to correspond with existing light levels. (We all notice this phenomenon when we leave a dark theater and emerge into the sunlight.)

While adequate levels of illumination must exist for the office worker to read printed or handwritten copy easily, the presence of glare sources (direct or reflected) within the worker's field of view must also be minimized. If this is not done, the visual sensitivity mechanisms may be forced to readjust rapidly back and forth between the light level on the desk and the much higher levels of bright sunlight at a window 10 feet away, but in the direct field of view.

As a rule of thumb, there should be between 37 and 56 footcandles (400 to 600 lux) of light falling on the print surface, while, at the same time, light-intensity ratios in excess of 3:1 in the immediate visual field should be avoided.

When a CRT terminal is introduced, the problem becomes much more complicated. The presence of an upright glass screen serves as a kind of mirror that nicely reflects images of the surrounding work place, particularly glare sources such as windows and light fixtures located behind the operator. Thus, if one has a terminal located under a long row of fluorescent light fixtures, the fixtures far in front of the operator will appear in the field of view as a direct glare source, while those behind appear on the screen as a reflected glare source. The latter will present the additional problem of washing out the light on dark characters on the screen, reducing contrast and making reading more difficult.

As a result, the solution requires that lighting fixtures be located in such a way as to provide sufficient footcandles on the operator's copy while at the same time minimizing the glare/contrast reduction problems inherent in the presence of an upright glass screen.

Adequate solutions to this problem are not yet evident from the lighting industry. However, a number of things will improve the situation. One can simply rearrange desks, move or tilt terminal screens and, if possible, relocate lighting fixtures to minimize the obvious reflections seen on the screen. In many cases, it may be necessary to turn off certain overhead lights, and to use individual desk lamps ("task lighting") to provide the necessary illumination. However, one must be quite careful that the task lights themselves do not act as glare sources for other workstations.

Some sort of window covering is clearly necessary. Good old-fashioned venetian blinds are probably as good as anything else. You should also be alert to other potential sources of glare such as highly reflective table tops, wall fixtures and even the keys and case of the keyboard itself. It might be tempting to avoid some of these prob-

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lems by eliminating windows and using dark colors and shades throughout the work place. This would almost certainly be counterproductive; any glare-control gain would likely be offset by reductions in morale. No one wants to work in a cave!

Adjusting the lighting is probably the most effective technique for glare control. However, if your degrees of freedom in this regard are limited or absent, other possibilities do exist since a variety of glare-control treatments are available. One must exercise care in their selection, however, to ensure that glare control is not achieved at cost of contrast reduction. The added cost of the better treatments is almost certainly worthwhile. Simply taping pieces of cardboard in appropriate locations above screens and adjacent to offending light fixtures may be very effective interim measures.

A number of lighting fixtures and systems are available, but one should look very carefully at their relative costs and benefits, ergonomic as well as financial. You should certainly insist on setting up demonstration units in your own work place for relatively long periods of time to find out how you and your people respond. At the very least, you should visit other CRT terminal installations where these lighting fixtures have been installed. In addition, do not neglect to inquire about maintenance. I have been told that one popular lighting fixture requires cleaning with Q-Tips!

The quality of the characters displayed on most commercially available terminals leaves a lot to be desired. The quality of the recent CRT-generated pictures of Saturn proved that better quality is possible.

The most useful approach is to develop an eye for image quality just as a stereo buff develops an ear for sound quality. Characters should be crisp, clear and, above all, stable. The operator should not notice any distortion, jittering, bouncing or flickering of characters, which should be large enough to be easily read (16 min of arc is a minimum; 20 min is preferred). However, if characters formed from dot matrices are too large, the spaces between the dots will become evident and this also interferes with ease of readability.

Screens with so-called reverse video (dark characters on light background) are now available and have certain advantages because some glare problems are minimized. However, one should be particularly alert for the presence of flicker in such displays, since the human eye is much more sensitive to flicker from a bright source of light than from a darker one.

Finally, character brightness and contrast should be independently adjustable.

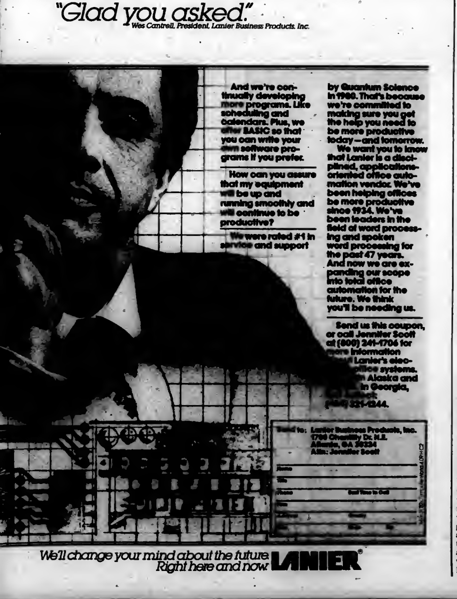
Furniture is the second critical area to consider. Excessive strain on the musculoskeletal system will result from any activity in which a person is forced to maintain the same posture for long periods of time. In an automated office, where a large percentage of a person's daily work activity will involve interaction with a single CRT terminal, musculoskeletal strain will be of particular concern, and can be exacerbated if that posture is awkward or "unnatural," resulting in pains of the back, shoulders, arms and wrists.

Strain can be minimized if the workstation is designed to enable each operator to work with the home row of the keyboard at about elbow height, so that the forearm is approximately parallel to the floor and the angle of the wrist, with respect to the forearm, is within 5 to 10 degrees. At the same time, the feet must be flat on the floor (or foot rest) with adequate thigh clearance and firm support for the lumbar (lower back) region of the spine.

Finally, the line of sight from the operator to the screen should fall within 10 to 30 degrees from the horizontal, with the display screen located at a distance of 50 to 70 centimeters (from 20 to 28 inches).

A few minutes of fiddling with a tape measure will demonstrate that these goals cannot be achieved with conventional office furniture, one-piece terminals and ordinary chairs. People vary considerably along several important body dimensions; designing for the average means, at best, that a larger number of users will be only somewhat uncomfortable as opposed to very uncomfortable.

It is also important to realize that user populations of OA equipment will soon include large numbers of males as well as females, and a diversity of racial and ethnic groups. Thus, even the computed average body dimensions used for traditional office furniture design are inappropriate because they were based on populations of North American women.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The key to effective ergonomic design is flexibility. The display terminal must have a detachable keyboard and a tiltable screen. Terminal workstations must be easily adjustable, with independent adjustments for keyboards, and screens.

A good chair is crucial; it should have an easily adjustable seat height and back rest, provide lumbar support and possess a five-point base. In addition, the use of a wrist rest — immediately in front of the keyboard — along with a good copy holder are inexpensive but essential elements in minimizing potentially stressful arm and wrist angles.

Equipment with the above specifications is now commercially available. If one is stuck with CRT terminals with nondetachable keyboards, some improvement in the situation is possible through the use of desks with a single adjustable surface. The operator can then have the choice between minimizing neck strain or wrist strain.

The physical environment, with its heat and noise, is another variable that must be considered. Electronic equipment tends to generate a lot of heat and requires extensive air conditioning systems in large-scale CRT terminal installations. However, if heat removal is not accompanied by proper humidification, the resulting excessively dry air may result in exacerbation of eyestrain symptoms, dry skin and other problems. Those who wear soft contact lenses are explicitly warned to avoid dry air and may be particularly troubled.

On the whole, when the soft click of terminal keyboards replaces the clattering of the typewriter, the office environment is, with one exception, a much quieter place. That exception is, of course, the printer. Some early printer models exhibited noise levels in excess of 80 decibels — levels which are enough to be labeled as occupational noise hazards.

Paradoxically, once we have dealt with the printer problem, it may become too quiet; ordinary conversations by the person answering the phone at the next desk can become a significant source of distraction. I would argue that productivity losses in offices (automated or not) caused by the failure to provide a quiet, distraction-free place to perform demanding work are enormous, and that providing individualized, soundproofed work places would be one of the most cost-effective interventions one could provide.

Eye care is the final area I will cover here. Working at CRT terminals can be visually demanding. Because visual problems may be exacerbated by incorrect or inadequate visual corrections, it is simply prudent to ensure that appropriate screening treatment by visual professionals be accomplished. It must be pointed out, however, that traditional prescriptions may not always be appropriate, since CRT viewing distances tend to be greater than those typically used for reading glasses.

Prof. E. Grandjean, the eminent Swiss ergonomist, likes to describe the daily work day as a sort of vat that accumulates different kinds of fatigue from various sources. The preceding discussion has dealt only with one such source — environmental ergonomics. Ergonomic ("user-friendly") software, along with enlightened management/work practices is likely to be even more important in making the automated office a positive, productive place.

OA

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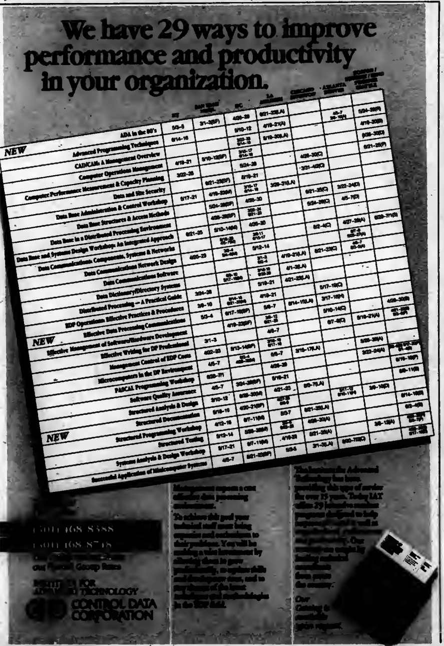
*Dainoff is an associate professor at Miami University, Oxford, Ohio, and is currently on a visiting appointment at the National Institute for Occupational Safety and Health in Cincinnati, Ohio.*



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(Continued from Page 55)

As automation enters the office, however, data and word processing are being merged rather than separated. We are looking for solutions for the vast majority of problems most office workers find in their daily routines. What good does it do to create a wonderful office system if a computer science Ph.D. is required to use ?

Or, is it worth using the simplest and most effective system money can buy if the user is uncomfortable working at it?

Such questions open up the area of ergonomics, which is the art or science of designing systems so that true and imaginary physical and mental aches caused by their operation are reduced. Physical aches are backaches, headaches, eyestrain, earaches and so on. They are caused by some defects in office layout and illumination, furniture, CRT terminals, printers, bulky printouts and the like.

Mental aches are frustration, confusion, loss of patience and other negative states of mind, which can be the consequence of humans interacting with computer-based systems.

Ergonomics is concerned with guiding the design of office automation (OA) systems so that they are easy to learn, easy and comfortable to use and effective in solving problems.

Physical ergonomics, such as office layouts, furniture and CRT terminals have received the major emphasis to date. Fortunately, most vendors have started to pay closer attention to these issues and are incorporating noticeable improvements into their products.

However, while the progress continues in physical ergonomics, issues related to the mental side of the problem are not doing so well.

As a matter of fact, these issues have hardly been explored, even though they may represent the most important aspect of OA systems. It is safe to assume that the majority of potential users lack the skills and training necessary to operate most systems available in today's market. It seems as though vendors expect their target users to have perfect memory capabilities, advanced Boolean logic training and highly developed deduction and induction techniques.

The remainder of this article will present a few examples of the issues that fall under the mental ergonomics category and some basic guidelines that should be used to develop software to reduce the mental aches mentioned earlier.

Although keyboards are often thought of only within the context of physical ergonomics, the layout and labeling of the keys is clearly within the mental area. Layout and labeling will be dependent upon the particular application for which the system or terminal is intended. For example, a terminal designed for airlines reservations will be different from a WP terminal even if both have the same physical profile.

In general, certain areas of the keyboard should be reserved for certain function keys according to their relative frequency of use. The area to the right of the typing area has proven to be the best place for the most often used keys, followed by the area immediately to the left of the typing area and so forth.

Unfortunately, many vendors have not grasped these simple ideas and insist on making the most naive mistakes, like placing cursor control keys — the most frequently used key in word processing — immediately over the typing area, which is the least desirable area in terms of operator accessability and comfort.

It is true that tradeoffs have to be made in order to accommodate all the desired function keys on the limited space available on a keyboard. However, many of the poor designs that are seen in today's products could be significantly improved if responsible vendors understood the issues they should be dealing with. IBM's recently announced Personal Computer has introduced the interesting innovation of placing the Shift/Lock key to the right of the space-bar, which should do wonders to annoy typists using the machine for WP applications.

Displays are another gray area between physical and mental ergonomics. In general, OA is forcing systems to deliver what could be described as the "what you see is what you get" effect, whereby displays are expected to be replicas of what will appear on paper. Thus, screens are being designed to accommodate such things as underlining, bolding, multiple pitches, variable spacing and multiple fonts. Few vendors offer most of these, but more sophisticated displays will continue to be announced.

As usual, however, big blunders occur even in the best of families. For instance, a recently announced state-of-the-art terminal features eight display modes, graphics, well-balanced keyboard, tilt, rotation and so on, but the shape of its characters is so poorly designed that it can make an operator dizzy..

Undoubtedly the weakest component in today's systems is also the most important; software is not only what a system does but how it does it. This "how" factor will be given the name "software ergonomics" and is the single major source of pain to humans using OA equipment.

Two general rules should be applied to the design of software. The first, dubbed "functionality distribution," deals with the allocation of the different functions of a system in relation to menus, single-purpose and multiple-purpose keys, mnemonics and commands. Likewise, it refers to the actual layout and design of such menus, and commands.

The second rule, called "consistency," applies to the establishment of a common approach to doing things — for example, placing a prompt on the screen always at the same location or giving the same logical meaning to conventions such as Insert or Control-C. Both rules are related to each other, and relaxing them is a severe source of operator irritation and frustration.

OA software should also be implemented in a layered manner. This means that proficient users are given ways to bypass certain executional steps that novices or casual users need in order to use the system without continuously referring to manuals or support personnel.

This brings us to the problem of documentation. If we start from the premise that manuals are integral parts of OA systems, it will not be hard to agree that vendors could improve their products tremendously by investing a little time and money in writing documentation that is understandable by office workers.

It might seem that users have no choice but to accept what is given to them by vendors. This is not the case. Users should learn how to evaluate both their needs and the available systems from the point of view of ergonomics.

This process should not be an extensive academic study, but instead, a practical and clear assessment of the various criteria that are deemed important in view of the specific applications and user intended for the system. A simple way of achieving this is to encourage a small group of alert target users to sit down at a terminal and operate the system. In the same way that a picture is worth a thousand words, an hour of terminal session can be worth a thousand hours of analysis.

An important finding that can result from this approach is whether a given application can be efficiently and effectively solved with existing technology. Of course, ergonomics plays a key role in defining both efficiency and effectiveness. Mistakes avoided in time will save precious resources later.

Finally, users should never stop demanding better documentation. Vendors are known for abandoning the improvement of their manuals the minute they stop hearing complaints, especially from important customers.

Conversely, vendors should convince themselves of the importance of ergonomics. It is not a buzzword, but probably the most important factor as far as product issues are concerned.

In order to make the first positive step in this direction vendors should control the amount of decision making currently in the hands of programmers and engineers, who have usually proven to be more concerned about machine efficiency than about human effectiveness. Many of the market failures of OA products have been caused by inadequate understanding of true user requirements and can be traced back to design teams unqualified to do the job. Needless to say, marketing and industrial engineers should prove to be better sources of well-designed systems from the ergonomics point of view.

Vendors should also not forget that documentation is important. A manual on how to use a word processor should not resemble a calculus quiz.

On a global basis, things will probably not change much. As technologies mature, their ergonomics become better understood and do improve. However, new technologies will undoubtedly be developed to take their place and these will also contribute to the mental and physical aches of users. OA

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*Koffler is president of The Koffler Group, an office automation consulting firm based in Los Angeles.*

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## WHAT IS IT?

# Electronic Mail

More than half of the Fortune 500 companies are looking at, designing or implementing electronic mail, yet — even in the DP community — very few people understand what electronic mail is.

The variety of assumptions and sets of expectations users have about electronic mail systems can leave the designer of such a system in limbo. The best available defense is to establish a clear idea of what is being created and for whom. A designer can achieve this knowledge by:

- Attempting to understand both the environment in which the system will be placed and the people who will use it.
- Tracking the paper mail system already in existence and using it as a basis for the electronic system.
- Noting the limitations imposed by the computer that will be the heart of the system.
- Forming a support group within the organization to handle administrative functions of electronic mail and to respond to user questions.
- Using a pilot system as a test run.

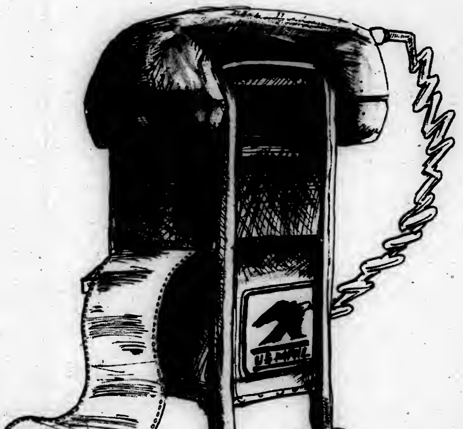

Illustration by Tom Monahan

### BY PETER BITTNER

Understanding the environment of a system and the people who will use it involves careful analysis of the ways in which electronic mail will affect the people involved. During the implementation phase, electronic mail should not disrupt the environment; rather, as people become familiar with it and use it, the system itself will promote change.

Electronic mail should not be viewed as a stand-alone system. It is only one system of a whole series of applications known as office automation. With electronic mail, as with any other system, determining the users of the system is a critical step in the design. Most people will not be using electronic mail full time because their job is not mail handling. They will use the electronic mail system only to get their own jobs done more quickly. With a good system, they will not only be able to send and receive information in a more timely fashion, they will also spend less time doing it.

Infrequent use of electronic mail does not indicate a person does not want to use the system or is afraid of it. Certain people may not need all the features available or may delegate most of their electronic mail needs to others. Such people can still be considered committed users of the system. When designing electronic mail, one must be aware that while there will be many users, their needs and frequency of use will vary.

Managers are among the users who will be most affected by electronic mail. Many companies are beginning to realize that, with the large investment in white-collar salary, benefits and training, it is important to provide managers and professionals with tools to do their jobs better. Often, managers spend much of their time performing nonmanagement functions. A properly planned and executed electronic office will enable them to spend more time doing the jobs for which they were hired and trained.

However, what may be acceptable when others had to enter and receive information from a terminal may not be acceptable when the manager has to do it. Managers may be concerned about using the computer because of a fear of losing face with employees who are more adept. The designer must be aware that, perhaps for the first time, management will become a direct user of the system.

It is also important to remember a secretary can make or break the system. The secretary will probably be the electronic mail expert in the department, performing the more complicated functions and answering questions from managers and professionals on how to use the system. The secretary will still be needed to type long letters and, in some cases, screen the incoming mail for a manager. Any system that attempts to bypass the secretary can disrupt the flow of information within an office.

***The new electronic mail system must fit into the existing office. If changes are required in office procedures to install the system, it will probably fail.***

In planning an electronic mail system, a designer must consider the total office needs of a company. Without proper planning, the office of the future will require several terminals on each desk, each linked to a different office automation system, each with its own protocol requirements. At the same time, trying to design an entire office automation package may result in the package never getting beyond the initial design stage.

The designer should remember what is needed in the office as the first system is being designed. A five-year plan, stating what a company's office automation goals are, should be drawn up and approved by management. As time progresses, the goals will change and the emphasis on different aspects of office automation will increase or decrease. However, the systems that have already been developed will have a better chance of being useful in the future.

Simply by working in an office, the designer should be able to get a good idea of how things work. How does paperwork flow? How is the copier used? What letters and memos get filed? How much of the mail is internal and how much is external? The new electronic mail system must fit into the existing office. If changes are required in office procedures to install the system, it will probably fail.

The security needs of previously designed systems create a tendency to restrict the use of some mail functions to certain people on the system. Such restrictions should be avoided. Look at what a paper mail system does or does not allow and use this as a basis for designing restrictions to electronic mail.

Often, since a system must use the existing hardware, the choice of what type of computer to use for electronic mail is not up to the designer. The type of computer on which electronic mail is installed will affect the design of the system, however. For electronic mail purposes, two types of systems exist: a single-site-based electronic mail system on one or several CPUs that are locally connected; and a distributed-network-based electronic mail system on several CPUs that are not locally connected.

With a single-site-based electronic mail system, electronic mail exists on only one CPU or on a group of CPUs connected locally. While other remote computers may exist in the network, they have no electronic mail functions. Mail information is passed through these machines to the system handling electronic mail. Usually, this type of system operates on the large mainframe CPUs, although some minicomputer-based systems do exist. GTE Information Systems Telenet's Telemail system is a single-site-based system, even though it operates on several Prime, Inc. computers.

In a distributed-network-based electronic mail system, electronic mail logic exists in several CPUs that are not locally connected. Each computer handles locally as many mail functions as it can. Mail destined for people assigned to another computer is transmitted to that computer for delivery. In some systems, one computer acts as a central distribution point; all mail destined to another computer goes to the distribution point computer, which sorts the mail and sends it on to the receiving computer. Still other systems have the sending computer transmit electronic mail directly to the receiving computer. Generally, distributed-network-based systems operate on minicomputers or communicating word processors.

Single-site-based electronic mail systems have the advantage of almost instant delivery of mail. The sender can enter SEND and, seconds later, the message will be available to the recipient. The recipient does not have to be at one location to receive mail and can sign onto the system from any location, which makes distribution of mail easier. Each person on the mail system is identified on the same computer and the routing information does not have to specify the computer to which the mail should be sent. Communications costs will be high in a single-size system and system failure will bring down the entire electronic mail system.

With distributed-network-based electronic mail systems, the computers can work interactively with the terminal user. Such functions as end-of-line detection and automatic movement of the last word to a new line are possible. Computer failure because of hardware or software problems would affect only the people working on that machine.

However, distribution of mail is more difficult in distributed network-based systems. Communication links between computers are often maintained only some of the time. A scheme would have to be developed to determine if delivery should occur immediately, at the next regular connect time or overnight. A priority scheme might be needed to determine who is authorized to use the immediate delivery option. Mail would have to be sent to the computer nearest a person's workstation.

Directory information would also have to be updated as people move from place to place. If the directory is to be maintained on only one computer, it may take hours to notify a sender that the recipient no longer exists on the mail system. If each computer is to have a directory, it will be necessary to keep all directories in agreement; when a person is away from his or her normal work area, it may be difficult to obtain the mail through another computer.

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lot of traveling, the designer must develop a method whereby a person can gain access to his or her mail, no matter which computer the person signs onto.

Next, a support group should be established in an organization to handle the administrative functions of electronic mail and to respond to user questions. These people must be able to understand and interact with the users of the system acting both as a guide and adviser and a troubleshooter when problems arise.

A few points on the advantages and disadvantages of leased vs. dial-up lines should be considered. Leased lines offer high-speed transmission of data; more information can be sent and received while avoiding the problem of slow response time. Office areas with sufficient volume would realize cost savings over the use of dial-up lines, but electronic mail alone probably cannot justify the cost of installing leased lines.

*External mail will also be on paper for the foreseeable future because different electronic mail systems will probably not be able to talk to one another.*

Dial-up lines are useful when people travel to places where there is no company office or when people want to take work home. A light-weight terminal can be taken home or on a trip so that a user can dial into the system and review and create mail without having to be in the office. A dial-up system is also useful when there is frequent movement of offices. Leased-line cables do not have to be taken up and installed someplace else.

The flow of paper mail will indicate the normal flow of communication for future electronic systems. In addition, within any organization, people will exist who are not on the electronic mail system and who will still receive and send paper mail. External mail will also be on paper for the foreseeable future because different electronic mail systems will probably not be able to talk to one another.

A problem occurs when the same message has to be sent to people on the electronic mail system and people not on the system. One hopes the message will not have to be typed twice, and, to a limited extent, electronic mail systems can handle paper mail. When sending outgoing messages, the electronic mail system will recognize that a recipient is not on the system. The sender can then be asked for the address of these unknown recipients. A file containing names and addresses of people who are frequently sent mail could be maintained within the electronic mail system. When a complete address has been obtained, the message is routed to a high-quality printer in the mail room, where the message can be printed, placed in an envelope and mailed.

Finally, a pilot system is recommended. Because electronic mail is new, many ideas will have to be tried, not all of which will work. It is possible to design and implement a very good electronic mail system only to discover after a few months that the system is not meeting the needs of the company. As people use the system, they will find some functions unnecessary and others indispensable.

If at all possible, you should develop a pilot electronic mail system. Build a basic system — a small-scale system with only a few functions. (It can be expanded later.) Test it in a user area that has mostly intra-area communication. For a distributed-network-based electronic mail system, install the system on only one computer.

During the pilot, the designer can discover those parts of the system that do or do not work and will find out what features are still needed. The pilot should serve as a learning tool on how to sell the system to the user as well as to indicate how much training will be needed to get a user started on the system.

In short, a successful pilot should enable the designer to develop a final product that will better fit a company's mail needs. OA

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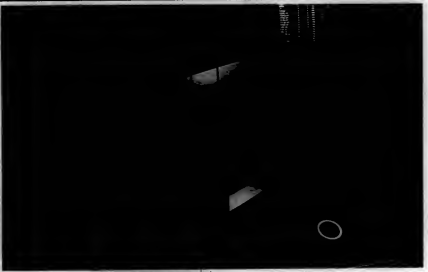
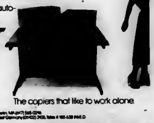
*Bittner is an associate with Keiffer, Martino and Associates, Inc., a computer consulting firm based in Cheektowaga, N.Y.*





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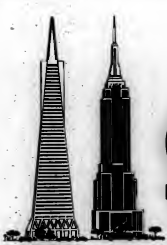

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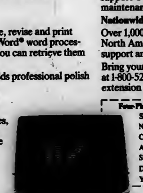

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THE TIE THAT BINDS

# Local-Area Nets

Large and small companies alike are seeking the holy grail of the office — local-area communications. The advent of office automation (OA) has created the need for communication among various word processors, personal computers, CRT terminals, electronic typewriters, facsimile machines and other office equipment. This communication most frequently occurs within the same building or a series of buildings located within a few miles of each other.

Almost every vendor has the best technological solution

BY BRUCE HOARD

| Company Name | Broadband | Baseband | Line Access Method | Cable Medium | Transmission Speed | Number of Supportable Devices | Topology | Price Per Device Attachment | Addressing | Extra Software Change |
|---|---|---|---|---|---|---|---|---|---|---|
| **Amdax Corp.**<br>**Cablenet**<br>**(Two Versions)** | x | | TDMA† | Coaxial | 7M bit/sec<br>14M bit/sec | 16,000 | Bus | $1,465<br>With 60 Devices<br>$1,162<br>With 60 Devices | 16 bit<br>(logical)<br>12 bit<br>(physical) | No |
| **Data General Corp.** | | x | Token Passing | Coaxial | 2M bit/sec | 32 | Bus | $3,400 | Not Available | $1,870 |
| **Datapoint Corp.**<br>**Arcnet** | | x | Vendor Won't Disclose | Coaxial | 2.5M bit/sec | 255 | Bus | $500 | 8 bit | No |
| **The Destek Group**<br>**Desnet** | x | x | CSMA/CD* | Coaxial<br>Twisted Pair | 2M bit/sec | 4,608 | Bus | $255<br>With 9 Devices | 8 bit | No |
| **Digital Microsystems**<br>**Hinet** | | x | Master Slave Polled | Dual Twisted Pair | 500K bit/sec | 255 | Bus | $1,595 | Single Byte User I.D. | No |
| **Interactive Systems/3M, Inc.**<br>**Videodata** | x | | Proprietary Scheme for Each Device | Coaxial | 300K bit/sec to 2.1M bit/sec | 10,000 | Bus | $400 to $800 | 8 bit | No |
| **Network Systems Corp.**<br>**Hyperchannel** | | x | CSMA/CD | Coaxial | 50M bit/sec | 64 | Bus | $40,000 | 8 bit | $100 to $400 Per Month |
| **Proteon Associates, Inc.**<br>**Pronet** | | x | Token Passing | Twisted Pair<br>Coaxial<br>Fiber Optics | 10M bit/sec | 255 | Star/Ring | $500<br>With 16 Devices | 8 bit | No |
| **Sytek, Inc.**<br>**Localnet**<br>**Model 20/**<br>**Model 40** | x | | CSMA/CD | Coaxial | 128K bit/sec<br>2M bit/sec | 20,000 to 60,000 | Bus | $525<br>With 8 Devices<br>$40<br>With 256<br>(Plus Software) | 16 bit and 32 bit | No |
| **Ungermann-Bass, Inc.**<br>**Net/One Baseband**<br>**Net/One Broadband** | x | x | CSMA/CD | Coaxial | 10M bit/sec<br>5M bit/sec | 1,024 | Bus | $450<br>With 24 Devices | 48 bit | No |
| **Wang Laboratories, Inc.**<br>**Wangnet**<br>**(Three Bands)** | x | | CSMA/CD | Coaxial | 9.6K bit/sec to 12M bit/sec | 16,000 | Bus | $380<br>With 10 Devices | 16 bit | No |
| **Xerox Corp.**<br>**Ethernet** | | x | CSMA/CD | Coaxial | 10M bit/sec | 1,024 | Bus | $250 to $1,000 Depending on Device | 48 bit | No |

*Carrier Sense Multiple Access with Collision Detection
†Time Division Multiple Access

**A Cross-Section of Local-Area Network Offerings . . .**

to fill this void. Unfortunately for users, all these "best" answers are not necessarily compatible with each other. Baseband, broadband, collision detection and token passing are some of the red-hot buzzwords currently being bandied about in the computer and electronics press.

The IEEE Local Area Networks Standards Committee is trying to make sense out of this Tower of Babel by promulgating standards to govern the proliferation of local-area networks. However, coming at a time when several vendors — most notably Xerox Corp., proponent of Ethernet — already have operable units in commercial use, standards may be ignored by vendors that have no desire to retrofit their products.

This is especially true in the case of Ethernet, which has inspired a host of companies devoted to producing Ethernet-compatible local network devices.

In the meantime, the IEEE committee is in search of what has become known as the 802 standard. The committee is currently completing the finishing touches on three separate kinds of access methods and media, with an eye toward promulgating the absolute finished product by the end of 1982.

The three access methods settled on by the 802 committee are carrier sense multiple access with collision detection (CSMA/CD), a token passing ring scheme and a token passing bus scheme.

Baseband and broadband are the two predominant media used in local nets. Baseband versions use a kind of coaxial cable that transmits digital signals over distances up to approximately 2,500 meters at speeds to 10M bit/sec.

Broadband networks use standard CATV coaxial cables, which carry radio frequency transmission up to 50 miles at speeds up to 20M bit/sec. A third contender is fiber-optic cable, which is difficult to tap and add onto, but offers low susceptibility to electromagnetic interference and transmission speeds up around the 100M bit/sec level.

CSMA/CD is currently the most popular line access method and the first of the three embraced by the 802 committee. It is based on contention.

Using it, communicating devices attached to the local-area network must first monitor the network to see if any other node is transmitting. If one is transmitting, the node wishing to transmit must wait for completion of the initial message before transmission can occur.

If the network is clear, however, the message is routed onto the network, which continues to be monitored by the transmitting device in order to detect any data collisions in the event another node attempts to transmit simultaneously.

The second 802 line access recommendation is the token passing ring approach. The "token" in token passing is actually several bits of data, which are passed from one node to another. Each successive node examines the bits to see if there is a message for it and then either receives the message or passes the token on to the next node.

The "ring" part of the token ring refers to a network topology where all nodes are linked together in a ring or closed loop.

The third 802-favored line access method, the token bus approach, uses token passing and a bus topology characterized by the ability of each node to monitor any transmission put on the bus by another node. With the rapid proliferation of companies joining the fray, any list of local-area networks and their vendors cannot help but be obsolete by the time it is published. Here is a rundown on the offerings in the above chart.

Keep in mind, however, that these are meant to be only a *representative* sampling of what's available.

| Company Name | Geographical Scan | Installed Base | Minimum Distance Between Nodes | Maximum Distance Between Nodes | Vendor Devices Supported | X.25 Gateway | Data | Voice | Video | Availability |
|---|---|---|---|---|---|---|---|---|---|---|
| **Amdax Corp.<br>Cablenet** | 50 Miles | 12 | None | None | All RS-232C and RS-449 | No | Yes | No | No | 90 Days |
| **Data General Corp.<br>Xodiac Network Bus** | 1 Mile | 0 | 9 Feet | 1 Mile | DG Only | Yes | Yes | No | No | 190 Days |
| **Datapoint Corp.<br>Arcnet** | 4 Miles | 2,000 | None | None | Datapoint Only | No | Yes | No | No | 90 Days |
| **The Destek Group<br>Desnet** | 4 Miles | 0 | None | Undetermined | All RS-232C or Centronics I/O Port | No | Yes | No | No | February |
| **Digital Microsystems<br>Hinet** | 1,000 Feet | 1,000 | None | 1,000 Feet | Each Station Is A Network Proprietary Microcomputer | No | Yes | No | No | One Week to 10 Days |
| **Interactive Systems/3M, Inc.<br>Videodata** | 50 Miles | Approximately 250 | None | None | All RS-232C | No | Yes | Yes | Yes | 90 Days |
| **Network Systems Corp.<br>Hyperchannel** | 5,000 Feet | 902 | None | 5,000 Feet | Most Major Mainframes | No | Yes | No | No | 60 to 90 Days |
| **Proteon Associates, Inc.<br>Pronet** | 15 Miles | 10 | None | 300 Meters | DEC (Unibus and Qbus) | No | Yes | No | No | 90 Days |
| **Sytek, Inc.<br>Localnet<br>Model 20<br>Model 40** | 50 Kilometers | 65 | None | 50 Kilometers | All RS-232C | No | Yes | No | No | 60 Days |
| **Ungermann-Bass, Inc.<br>Net/One Baseband<br>Net/One Broadband** | 2,500 meters<br>10 Miles | 100<br>0 | None | 2.5 Kilometers | Must Meet Ethernet* Specifications | No | Yes | No<br>Yes | No | 30 to 45 Days<br>August '82 |
| **Wang Laboratories, Inc.<br>Wangnet** | 2 Miles | 0 | None | 2 Miles | All RS-232C and RS-449 (Utility Band)<br>Wang Only (Wang Band) | No | Yes | Yes | Yes | Depends On User Needs |
| **Xerox Corp.<br>Ethernet** | 2,500 Meters | Number Not Released | None | 2.5 Kilometers | Must Meet Ethernet Specifications | No | Yes | No | No | 90 Days |

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Amdax Corp. (Cablenet). This broadband bus network has two versions that offer 7M bit/sec and 14M bit/sec data rates. It employs a time division multiple-access line method, said to eliminate the data collisions of CSMA/CD.

*Amdax Corp., 160 Wilbur Place, Bohemia, N.Y. 11716.*

Data General Corp. (Xodiac Network Bus). This baseband token passing network is the only one in this group to offer an X.25 gateway to packet-switched networks. However, there is an extra software charge.

*Data General Corp., 4400 Computer Drive, Westboro, Mass, 01581.*

Datapoint Corp, (Arcnet). Designed for Datapoint products, but Radio Shack has made its microcomputers compatible and there is a limited IBM gateway to this baseband network.

*Datapoint Corp., 9725 Datapoint Drive, San Antonio, Texas 78284.*

The Destek Group (Desnet). Said to support baseband, broadband, fiber optics and telephone company lines. Currently in beta test.

*The Destek Group, 1923 Landings Drive, Mountain View, Calif. 94043.*

Digital Microsystems (Hinet). With Hinet, a baseband offering, every network node is a Z-80-based microcomputer with 64K bytes of random-access memory.

*Digital Microsystems, 1840 Embarcadero, Oakland, Calif. 94606.*

Interactive Systems/3M, Inc. (Videodata). Broadband bus; uses unusual line access method in which each node uses a dedicated frequency.

*Interactive Systems/3M, Inc., 3980 Varsity Drive, Ann Arbor, Mich. 48104.*

Network Systems Corp. (Hyperchannel). Baseband bus network links mainframe computers and features 50M bit/sec transmission speeds.

*Network Systems Corp., 7600 Boone Ave., N. Brooklyn Park, Minn. 55007.*

Proteon Associates, Inc. (Pronet). Another vendor-specific product, relying on Unibus and Q-Bus connections to Digital Equipment Corp. PDP-11 and VAX computers

*Proteon Associates, Inc., 24 Crescent St., Waltham, Mass. 02154.*

Sytek, Inc. (Localnet). The Model 20 uses frequency agile modems with top speed of 128K bit/sec over up to 120 channels. There is a faster version to link mainframes. Both are broadband

*Sytek, Inc., 1153 Bordeau Drive, Sunnyvale, Calif. 94086.*

Ungermann-Bass, Inc. (Net/One). Just introduced a broadband version of Net/One said to be compatible with Net/One baseband, which is compatible with Ethernet. The company also OEMs Ethernet components to Xerox and others.

*Ungermann-Bass, Inc., 2530 Mission College Blvd., Santa Clara, Calif. 95050.*

Wang Laboratories, Inc. (Wangnet). Wangnet features three "bands," the first for non-Wang devices, the second for Wang devices only and the third for video transmission.

*Wang Laboratories, Inc., One Industrial Ave., Lowell, Mass. 01851.*

Xerox Corp. (Ethernet). Baseband network developed jointly by Xerox, Intel Corp. and DEC. Highly publicized network due to the alleged limitations over the bandwidth capabilities.

*Xerox Corp. 701 S. Aviation Blvd., El Segundo, Calif. 90245.*

OA

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*Hoard is senior editor, office automation, at* Computerworld.

## *Planning for Word Processing*

*(Continued from Page 24)*

equately estimated. WP vendors too often present the illusion of "plug-in" solutions, completely void of proper systems development and project planning methodologies.

It is crucial that the WP user organization define, in detail, long- and short-term information processing requirements. Methodologies must be developed and included in the organization's WP master plan to ensure adequate planning and subsequent follow-up, in addition to providing the evaluation/selection team with the necessary direction required to make an informed recommendation.

In general, two types of personnel will use the WP system. The first and perhaps largest group is composed of casual users — those who use the system infrequently. These users may never be completely familiar with the WP system or proficient in using it.

This situation increases the importance of selecting a system that is easy to use, requires a minimal level of training and provides the operator with readily accessible prompts when questions or problems arise in the course of a dialogue between user and machine.

The second group consists of "professional" WP operators — individuals who regularly use WP equipment on a full-time basis. These employees can be expected to exhibit a higher level of proficiency and a greater degree of productivity than the casual user. At the same time, members of this group must have a specialized set of job-related skills.

Skill and aptitude testing may help to identify potential candidates and can benefit both the organization and the employee by putting the right person in the right job. First, however, a detailed set of job descriptions, something many organizations develop long after the WP system has been installed, should be developed.

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Too many organizations are completely unaware of the importance of establishing an environment in which the WP operator can achieve the highest possible levels of productivity. For example, operator fatigue, one of the greatest obstacles to optimum productivity, can be all but eliminated by the proper use of lighting and the reduction of both noise or visual distractions. Other effective techniques include the elimination of (or at least significant reductions in) people traffic through the work area, the provision of scientifically designed workstations and the reduction of menial tasks by use of software and hardware functions.

Too often, no adequate standards exist for the operation of WP equipment. For example, problem identification or problem solving procedures for either software failures or equipment malfunctions are often inadequate or even nonexistent. Issues relating to disaster planning — determining what data should be backed-up and how often, off-site storage for data and so on — are sometimes overlooked until it is too late.

In organizations with "remote" locations, communication between users in the field and the home office is often lacking. As a result, users cannot share information about problem identification techniques and problem resolutions, or methods for increasing efficiency, productivity and overall system throughput. One method that has been used is creating and distributing an internal newsletter to WP users; another is encouraging WP operators and WP managers to join professional WP organizations and vendor-sponsored groups, which avoids the costly exercise of reinventing the wheel.

Another common failure is neglecting to conduct a comprehensive evaluation of the overall effectiveness of the new WP technology. Have the anticipated goals and objectives been attained? Did the installation proceed as easily as the vendor implied? Have projected cost-savings, increased operational efficiency and higher levels of productivity and throughput been realized? Are users of the WP system satisfied? These are all important questions to ask.

Based on the organization's initial experience with WP, are there any recommendations for improvement, application areas that can be enhanced, or new opportunities identified for extending WP technology into other areas within the organization? And, perhaps most important of all, was the implementation of WP a sound business decision?

The equipment itself offers another important area of consideration. Does the system perform as advertised? After the initial "burn-in" period, does the system perform in a predictable, consistent and satisfactory manner?

As the demand for word processing increases within the organization, there is a general tendency to add more equipment before fully exploiting the current configuration. In addition to sharing WP facilities among multiple, diverse users, techniques such as scheduled lunches and breaks and staggered shifts are often overlooked. In addition, modification of the initial applications should be seriously considered; they were probably implemented inefficiently because of the newness of WP. This step alone has often extended the life expectancy of a system.

When additional capacity or functionality is warranted (and cost-justified), many organizations continue to buy blindly from the original WP supplier, rather than to investigate secondary sources for compatible — and usually less expensive — equipment, supplies and software packages.

***WP vendors too often present the illusion of "plug-in" solutions, completely void of proper systems development and project planning.***

After the WP hardware decision has been made and the system installed, it is important not to overlook the need to remain abreast of technological enhancements. They could improve functionality and operator productivity and reduce overall operating costs. This task is often not even assigned to the manager or executive responsible for WP within the organization.

How can users avoid all of these complex, expensive and, perhaps, disastrous problems associated with WP technology? Just as the issues and problems are not easy, neither are the alternatives. If warranted, some organizations may decide to hire a professional as a full-time staff member. The other alternative is to collect any and all literature on the subject of word processing. Others may contract with a management consultant who specializes in the area of word processing and its related technologies.

Whatever the decision, organizations must realize that if they are willing to spend the extra time required to lay the foundation in all the areas affected by WP technology, they are much more likely to be satisfied with their return on investment. **OA**

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*Elam is manager, Management Advisory Services, Alexander Grant & Co., a Dallas-based accounting firm.*

## Choosing the Right Configuration

(Continued from Page 24)

personal computers. Within each of these categories, multiple subgroups exist, involving many optional extras. Consequently, ascertaining a precise definition for a particular system becomes extremely complex.

The structure and capability of the terminal provide distinguishable characteristics by which word processors are defined:

- Blind terminals have no screen or display and produce hard copy during both the input and output cycles.
- One-line or thin-window display units are systems that have an LED display of eight to 25 characters, or approximately one line of text.
- Partial page display terminals have video screens showing anywhere from eight to 30 lines of text.
- Full-page display units show the user a full page of text.
- The dual display is a less common system and provides both the thin-window display for observation as keyboarding is under way and a full-page display for editing.

Further definition is affected by the kind of storage media used in the system. Currently available are floppy disks in 3-, 5- and 8-inch diameter; magnetic cards; fixed disks; and removable disks. To complicate the issue even more, floppy disks are available as single-sided, single density; single-sided, dual density; dual-sided, single density; and dual-sided, dual density.

The broad definition of the stand-alone system includes all of those pieces of equipment which contain the operating system, the software packages and the disk file at the workstation. This type of system is entirely independent and does not rely on a central processing unit for its functionality; neither does this piece of equipment share any functionality or capability with other systems.

The evolution of the shared-resource system has resulted from the availability of increasingly powerful stand-alone systems. For example, removable disk filing systems with several megabytes of storage capacity are now available, as are sophisticated software packages for use on stand-alone systems along with powerful communications options. The cost of providing all of these features is included with the acquisition cost of each workstation. Shared-resource systems are essentially stand-alone systems sharing peripheral devices such as printers, which can be expensive and may represent a large portion of the individual stand-alone workstation purchase price or the total cost of a shared-logic system. Many vendors now offer as an option the capability of sharing printers between workstations; other vendors permit sharing of the disk drives.

The shared/distributed logic concept lowers the cost of acquiring multiple workstations considerably, since there is the potential for multiple video displays to be dependent upon one processor, one software program, one disk file and one or two printers. The advantages of working with this type of system instead of the more common stand-alone includes the availability of more on-line storage, more sophisticated software, superior functionality, job sharing, minimal media handling and standardization. In order to achieve these benefits, careful coordination of the shared-logic concept is necessary. Accurate assessment of the proper ratio of terminals and printers is critical.

The physical organization of the operating staff, provision of backup assistance in times of crisis and the establishment of effective file and media management systems are all crucial factors in the successful implementation of a shared system.

Shared-logic systems are increasing in popularity. According to recent statistics released by International Data Corp. of Framingham, Mass., 48,000 shared/distributed logic word processing systems, representing sales of $492 million, were shipped in 1981 in the U.S. alone. In 1982, this figure is expected to increase to 73,000 units, representing $730 million.

The cost of providing sophisticated software, massive files, logic, workstations and printers is shared by all terminals and results in substantial cost savings. The reasons for acquiring this type of system, however, have changed somewhat over the past two years. The ability to undertake concurrent data and text applications, massive on-line storage, programmability, development of a text data base and so on are increasingly cited as factors influencing the equipment decision, more than the decrease in cost per workstation.

One of the major disadvantages of a shared-logic system is its vulnerability to total breakdown. If the central processor goes down on a shared-logic system, all terminals are rendered inactive. On a shared-resource system, this will not happen.

The cluster system is a relatively new equipment configuration and incorporates most of the features available on the other types of equipment. This concept combines stand-alone, shared-resource and shared-logic technology. Connecting stand-alone and shared-system equipment together offers flexibility and allows access to both files and resources. This type of configuration therefore provides an excellent opportunity for growth and expansion of existing systems. However, it is not entirely without problems. The cluster system can present difficulties in the areas of archival storage, standardization, accessibility and some possible degradation of response time.

Cluster systems also include those systems forming part of a local-area network, which may include several kinds of workstations attached to one central processing unit, electronic file cabinets, printers and so on.

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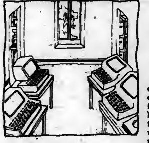

## *Choosing the Right Configuration*

The final major category of WP system is the software package available for installation on a mainframe computer, micro or personal computer.

Historically, the mainframe text processing software packages were usually designed by DP personnel for use by systems staff, primarily for the preparation of systems documentation. Consequently, they have a tendency to be code-intensive and rather more difficult to operate than dedicated WP systems, which have been designed specifically with the general office environment in mind. These software packages also offer less functionality and capability than dedicated word processors.

To date, the WP packages designed for personal computers do not compare favorably with the operational simplicity of dedicated WP systems. They are suitable only for those situations where minimal WP needs are evident; however, this situation is showing signs of improvement.

To evaluate WP equipment needs, a study must be undertaken to identify those applications currently in existence in the organization as well as to consider future applications. Assessing the applicability of word processing requires a good grounding in its capabilities before any kind of requirements overview is undertaken.

Some of the basic features available on almost all WP systems are global search and replace, sort, move, copy, insert and delete. More advanced features frequently available only as purchasable options might include math, records processing, programmability, communications, spelling check, mailing list management and so on.

After determining exactly what functions are required, and in order to make a fair and reasonable comparison, a user should ask each vendor very similar questions, addressing the following issues:

- Ergonomics.
- Human Interaction.
- Text Storage.
- Data Organization.
- Data Accessibility.
- Text Representation.
- Text Editing Features.
- Formatting.
- Applications.
- Output.
- Telecommunications.
- Cost and Delivery.

Cost justification of word processing equipment can be effected using straight productivity increase factors. After the work load mix has been determined, it is relatively simple to judge whether significant increases in productivity can be realized with the addition of WP equipment. Other intangible factors are more difficult to document, but also have an impact on the cost-effectiveness of any system and should be considered.

The majority of WP systems installed today are not utilized to full capability. This is partially due to inadequate training provided for the operating staff, but a significant contributing factor is the poor awareness on the part of users of WP capabilities. Unless interested users become more aware of these capabilities, it is unlikely that word processing will ever reach its true potential as a versatile and powerful aid to overall office efficiency and management effectiveness.

Another obstacle to the growth of WP as a fully developed support tool is the tendency toward the centralized physical placement of many systems. It is difficult for a manager to take advantage of a CP/M package installed on a word processor unless the equipment is readily accessible. A physically dispersed system is preferable if WP is to become multifunctional.

The capabilities of WP systems will continue to increase. This factor, along with increased user interest and subsequent awareness, will play a significant role in the development of word processing as a fundamental element of the integrated office system. OA

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*Duffy is a partner in Duffy and Bentley Consulting Group, Office Systems Consultants located in Toronto, Ontario.*

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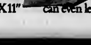

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## *Looking at Software*

*(Continued from Page 25)*

A functional compendium of the software available on word processing is mind-boggling.

For the purposes of this article, basic word processing functions, which include all input, edit and print functions of word processing plus automatic letter writing, paragraph assembly, global search and replace and basic statistical functions such as decimal tabulation and horizontal column movement, will not be covered in the following compendium.

**Full-Function Math:** Word processors today not only add, subtract, multiply and divide, but also do any combination of mathematical functions so long as an equation is written into the system explaining the series of steps. Functions written into the software (and accessible through function keys or mnemonic codes) include footing and cross-footing, percentage calculations and the ability to show negative figures either with a minus sign or in parentheses.

Some packages will verify totals that have already been typed into the system; others will calculate the totals. The most sophisticated programs allow you to set up a relationship between the columns on a page and then calculate additional information. In some cases, changing one number on a page will result in the changing of all affected numbers, similar to a very simplistic Visicalc.

**Records Processing:** Two kinds of records processing packages are now available on word processors.

The basic type offers the user the ability to select and sort items from a file of fixed-length records. However, some of these basic systems use Boolean logic to set up parametric searches. Others allow for the development of shell document and automatic merger of the selected records into text to produce final printout without an interim step. Sorting in these packages ranges from a simple alphabetic or numeric sort to multilevel simultaneous sorts of both alpha and numeric fields. Some packages offer the ability to mix fixed and variable length fields within the same record and some can search any word within a field.

The second type of records processing package on WP equipment goes beyond everything that is discussed above and includes report writers that compare favorably with minicomputer-based report writers. These packages not only produce reports based on previously designed layouts, but also maintain statistics on the number of records read and the number of records written and keep running totals on selected columns in multipage documents. Because these systems are more sophisticated than the basic records processing packages, using them usually requires specialized training, which is provided by the vendors at additional cost.

**Electronic Filing:** Today's word processors offer the capability of indexing documents in a variety of ways. Several have table-of-contents generators and key word index generators, which the system can then use to search for documents. Often the electronic director capability is standard with a certain level of WP software, most often those on shared-logic systems. In these systems, you can search the files for documents created by specific authors during specific periods of time and containing specific key words. Again, the software has wide-ranging capabilities, depending upon the vendor and the hardware involved. Recent announcements include WP software capable of full-text search, eliminating the need to record key words.

**Legal and Other Professional Billing Packages:** Both the WP vendors and third-party software houses have found a lucrative market in the development of time and billing packages for professional groups such as attorneys. They are offered currently on only a limited number of word processors.

**TWX and Telex Interface:** For those using one of the computer-based telex gateway services, several WP vendors offer direct interface into the network through a word processor. This interface is a software interface

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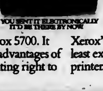

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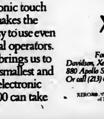

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## Looking at Software

only, with capabilities including formatting into Telex-required formats, insertion of destination codes based on stored tables, generation of multiple Telexes to present distribution lists and search of message text for unacceptable characters.

Other vendors offer a combination software/hardware interface that includes a "black box" as well as the software for both incoming and outgoing Telex traffic. The combination packages allow linking directly into the Telex network without having to go through a computer. They include automatic answer capabilities, and the hardware provides storage for incoming traffic and translation to and from WP file formats.

**Photo-Composition Interface:** Both straight software and software/hardware interfaces are available for interface between a word processor and almost any available photocomposition equipment.

**Communications Software:** Every word processor in the market offers communications software either to like machines, to computers or to other vendors' word processors. The software offerings vary widely in capabilities, from simple Ascii communication links to full-scale person-to-person electronic mail. If your word processor is a stand-alone, expect the communications options to be limited to electronic document transmission. For those with shared-logic word processors, full-scale electronic message systems are available for fast delivery of short communications to an individual, regardless of geographic location.

**CPM:** Many of the stand-alone word processors now offer a CP/M disk that turns the word processor into a microcomputer. The CP/M disk takes the place of the WP operating system and, once CP/M is involved, the WP software no longer works.

There are three major sources of WP software. The first and major source is the WP vendor. The major advantage of buying directly from the vendor is that the software is written for the operating system of your particular hardware and it is fully supported by the vendor (you avoid the "it's their fault" syndrome when something goes wrong). You are also dealing with the same sales representative who sold you your WP equipment in the first place. Several vendors have developed application banks. When you buy a particular type of software, you are privy to a variety of applications that have already been developed for that software. The WP vendors also often offer a variety of training packages for their software, from self-teach manuals to full-day in-house training programs at additional cost.

> ***It might seem that everything you could possibly want on word processing is already available. Unfortunately, that is not the case. Several types of software would be an enormous help in automating the office if they were widely available today.***

Several of the WP vendors have developed catalogs of third-party software that is written for their equipment using the vendor's propriety language. The most widely known of these is the Wang glossary language and its catalog of third-party vendors. Although you are dealing with the third party, the software is written specifically for your hardware and there are few problems with customizing it to meet your particular system's needs.

The third source of software for word processors consists of all the software houses that abound today. If you choose to get CP/M for your stand-alone word processor, you can also go to the various computer stores to buy off-the-shelf software. In both cases, the major problems are the possibility of incompatibility between the off-the-shelf software and your particular operating system and the lack of support after you buy the package.

Software selection for word processing should be approached systematically, just as application software evaluation for computers requires careful analysis. The software evaluation process can be divided into three stages. The process is not so complex for WP as for DP, but it follows the same general structure. The first stage, software screening, includes identification of software candidates, definition of selection criteria and selection of finalists. (If your selection criteria include a stipulation that only the WP vendor's software be considered, the screening stage may yield only one package. If that is the case, skip to Stage 3.

In Stage 2, software selection, the package is selected using criteria based on your functional needs. Although it might seem that the analysis ends when the package is selected, there are still several important steps remaining.

In Stage 3, software confirmation and design, you must review your functional requirements to determine if they should be altered to fit the package. This is especially important with records processing and electronic filing packages. In the case of third-party software, you must define any package modifications necessary for successful implementation. Skipping one or both of these final steps is an invitation to user dissatisfaction.

It might seem that everything you could possibly want on word processing is already available. Unfortunately, that is not the case. Several types of software would be an enormous help in automating the office if they were widely available today. The first of these is a protocol translator that does not require attendant hardware: software that will allow incompatible word processors to talk to each other in order to get editable text at the receiving end.

Second, we need software to translate files back and forth between word processors and data processors without stripping out the editing codes. This is an especially big problem for WP users electing to go the CP/M route in automating office functions on their word processors. When that CP/M disk goes into the word processor, all activity is under the CP/M operating system and the files developed cannot be used on the WP software. Currently, a limited amount of software is available to interface word processors with the intelligent copier printers. The software comes mainly from the WP vendors and is extremely limited. It would be helpful if software were available to give the user an option of which intelligent copier/printer could be used.

Finally, more end-user programming of a nonprocedural type is necessary if office workers untrained in computer programming are to be expected to automate their functions. The WP vendors have begun to provide such software, but this is an area where the third-party software houses could be very helpful.

The availability of all this software raises a question that has not been touched on at all in this article: Where do you start, with word processing or data processing? If word processors offer data processing capabilities and data processors have word processing software available, whose hardware do you start with?

The answer involves a simple question and a complex answer. What is my primary use for this equipment? A user must determine if he is going to be spending the majority of his time doing word processing or data processing.

The answer is quite complex. To find it, you must reassess not only what you are doing currently in your office, but also how you are doing it and even whether it should be automated at all. OA

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*Wilk is a manager in the Management Information Consulting Division of Arthur Andersen & Co.*

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(Continued from Page 25)

sion of a study to the production of a final report. In the interim, two or three drafts would be produced and revised. An excellent rapport existed between the two groups. The typists took pride in their ability to produce, clean, accurate copy of a high quality, and enjoyed an esprit d'corps not only among themselves, but also with the authors of the reports.

Management was naturally receptive to any proposal that promised to increase productivity and, on those grounds, considered the installation of word processors as a means of increasing the volume of work without additions to staff. Features of particular interest to them were the capability to store and recall text and the ability to make the necessary revisions for another draft in a fraction of the time, thus eliminating rekeyboarding and ultimately saving time. In fact, equipment vendors ensured management there would be a time savings and, ultimately, a reduction in staff. The vendor finally chosen went so far as to predict the number of jobs that could be eliminated. He did, however, warn management it would take from three to six months to train the operators fully and that there could be no staff reductions until after this training was completed.

Sixteen months after the equipment was installed and operating, we — as consultants — were called in by a vexed management. Training had taken the predicted six months and the decision maker had spent another 10 months waiting for the promised benefits to materialize. By the time he sought our consultation he was ready to throw out the equipment and go back to typewriters, but one thing prevented him from taking this action — the equipment had been purchased.

The substance of his complaints follows:

- There had been no staff reductions and there was no indication of any to come.
- It took the same length of time as before for operators and authors to produce approximately the same volume of material.
- The elapse time from the conclusion of a study to the production of the final report still remained at two weeks. However, the number of drafts required more than doubled, from two to three to an average of six to seven.
- The operators slackened off on the proofreading. As a result, the authors were annoyed because they had to make what they believed to be trivial and unnecessary corrections to the copy. They found more and more errors that they felt the operators should have caught and friction ensued.
- As the anticipated savings in time and energy (manpower) failed to materialize, researchers tended to blame the operators and the operators blamed the researchers; the harmonious relationships that had characterized the pre-word processing era evaporated.

Our investigations into the nature and causes of the problem indicated a number of complex, subtle perceptions and changing patterns of behavior were at work including:

1) The training period had been trying for the typists. The equipment had not been introduced in stages, but all at once. While learning to use it, the staff had still been held responsible for the production of the same volume of work as before. No such extra effort was demanded of the research staff, which continued to produce reports at the usual pace. The typists, feeling the burden of integrating the new equipment was theirs alone, developed resentments that were subsequently compounded by other developments.

2) All parties, management, researchers and typists, had nurtured unrealistic expectations about making corrections and changes. The authors seemed to believe that revisions did not require much more than the push of a button. They took less care in the writing of their reports and evolved into a pattern of creating first drafts that were merely skeletal, so that "revisions" became total rewrites.

***When It Doesn't Work***

3) Because of the skeletal quality of the first drafts, typists were denied the exercise of their editorial functions; they came to believe that their only requirement was to produce some form of typed document, not to plug holes and correct errors as they would in serious, well-thought-out drafts. As the authors grew more careless, so did the typists; they no longer felt the compulsion to proofread carefully and to be responsible for the accuracy of typed materials.

4) For the reasons described, the number of drafts grew; the capabilities of the equipment were used to prepare more drafts in the same length of time, rather than the same number of drafts in decreased time. And, without realizing time savings, there could be no staff reductions nor any opportunity to increase volume with the current staff.

5) For those reasons, also, the typists and authors drew apart; they no longer operated in concert, as a team, but worked almost as adversaries.

An unfortunate consequence of all this was that the typists, who had been highly skilled and effective prior to word processing, felt usurped by the equipment, angry with the researchers and resentful of what they perceived to be their reduced status. In addition, they believed management prized the sophisticated equipment more than their skills and performance and so lowered their standards to what they perceived to be the lower expectations of management, concentrating their efforts on the mechanics of operating the equipment, rather than on the applications of their skills in grammar, spelling, punctuation and breadth of vocabulary.

These were the findings that we presented to management. We then recommended that our findings and the supporting evidence be made known to both typists and authors and that management identify the problem, discuss its causes and involve both groups in the solution. The decision maker called a meeting of authors and operators to review the cycles of work before and after installation of the WP equipment. He reviewed the factors leading to the decision to purchase and described the stressful conversion and training period. He acknowledged that management had underestimated the complexity of the equipment and was guilty of oversimplifying both the extent of the training and mechanics of usage.

At this point, he accepted the blame and offered his and management's apologies for the difficulties that both the operators and authors had experienced.

During the presentation, he offered no judgments of personnel, found no fault and laid no blame. He also refrained from mention of the hoped-for staff reductions and the apparent conflict between the authors and operators. He defined the problem as one of reduced productivity and related its impact on costs and profitability. He then rephrased the problem as a challenge: "What can we do not only to increase current productivity, but to raise it to levels exceeding our previous best efforts?" He told those present that they were to develop an action plan, and allowed them two weeks to formulate their plans. Two weeks later, he met with them and they presented the following plan:

- They divided themselves into three working groups of both authors and operators. In these smaller groups, they believed they could better control the report production process, monitor results and take corrective actions as needed.
- They selected an operator within each group to perform in a lead capacity. This entailed routing of work, establishing overall priorities, scheduling personnel and maintaining records. The lead operator could also reject first drafts that were too sketchy and request that the author prepare a more complete draft.
- They also selected an author within each group to perform in a lead capacity. This role included responsibility for setting priorities and resolving scheduling conflicts.
- They developed a routing slip to be initiated at the time the author submitted the first draft. This slip was designed as an aid in monitoring the flow, timing and revision cycles of the report, to record information related to productivity and also a record of the agreed-upon deadline date.
- Because the authors had varying work patterns that did not necessarily fit into the regular work hours, the operators believed they could better accommodate the authors' needs and also reduce work pressures if they scattered their work hours so that there would be coverage from 7:30 a.m. through 7 p.m. They were also contemplating Saturday morning coverage, but decided to wait and evaluate the need. These extended hours were not overtime, but represented varying shifts. Each operator worked the regular 37½-hour week.
- They established group performance standards for both number of revision cycles and word processing throughput.

The decision maker approved the proposals and they were implemented. Within the next six months not only was morale restored to earlier high levels, but the average number of drafts dropped from six to seven to the initial two or three and the working time per report was cut from 10 working days to an average of eight. As a result, the staff was able to absorb a 20% increase in report volume. Although there were no staff reductions, productivity was improved.

This company was fortunate in its ability to face and deal with the problem and in the willingness of its personnel to work out a solution. Management today should blend the needs of both people and the organization with changes in the work place, whether it is the introduction of new equipment, computer systems or methods. Positive acceptance and adoption of these changes requires planning and sustained effort throughout. OA

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*Karon is president of Office Methods Ltd., a Chicago-based management consulting firm specializing in work flow and operations analysis.*

# OA TECHNOLOGY

**Xerox Corp.** unveiled two word processing software packages for the 860 information processing system. One-time license fees are $500 for its scientific equations and $300 for its word processing sort package, Xerox said from 1341 W. Mockingbird Lane, Dallas, Texas 75247.

**Digital Equipment Corp.** has unveiled an enhanced version of its word processing software, several systems options, pedestal packaging and four applications packages for Decmate. Version 2.0 of the Decmate WP software costs $500; optional math and list processing packages cost $400 each. The sort package costs $300 and the communications package, $150. The entire package costs $1,550. The four applications packages are a job-applicant system, $300; Smart-Mailer, a direct mail package, $250; an executive office management system, $250; and a financial modeling package, $250. DEC is located in Maynard, Mass. 01754.

Version 6J.A of its LEX-11 word and data processing system, which runs on Digital Equipment Corp.'s PDP-11 and VAX-11 systems and includes a 110,000-word spelling dictionary and an electronic desk diary has been released by **EEC Systems, Inc.** Prices range from $2,500 to $7,500, depending on the operating system, according to EEC at 286 Boston Post Road, Wayland, Mass. 01778.

**Harris Corp.** is offering a WP software option for its Model 1600 distributed data processing systems users, as well as a WP application package for its entire range of superminis. The Wordplus one-time license fee is $2,300. The WP package, Muse, is a full-screen, cursor-controlled package, with a one-time license fee of $8,500. A letter-quality, 40 char./sec daisywheel printer is also available for $6,000, or $144/mo lease for two years, according to Harris in Melbourne, Fla. 32919.

IEOS 1.4 is a WP software package with message services by **Datapoint Corp.** which runs on its 1550 small business computer, thereby expanding it to an integrated system. It is priced from $8,075, Datapoint said from 9725 Datapoint Drive, San Antonio, Texas 78284.

An electronic mail system called Messenger II that reportedly delivers hard copies of telephone messages and other communications to up to 2,000 users in a facility via desktop printing terminals is now available from **Amtel Systems Corp.** The Central Equipment Group costs $29,950 and the printing terminals that deliver (but do not originate) messages cost $550 each, Amtel said from 1293 Anvilwood Ave., Sunnyvale, Calif. 94086.

**Datagraphix, Inc.** has unveiled a remote imaging computer-output microfilm system, Advanced Remote Imaging System (Aria) II, which can interface directly with IBM 360, 370, 30 series and 4300 series computers, as well as other IBM-compatible manufacturers. The system will be available in the second quarter of this year for approximately $112,000. Datagraphix can be reached through P.O, Box 82449, San Diego, Calif. 92138.

Marking an expansion to the company's line of TRS-80 microcomputers, **Radio Shack** unveiled a multiuser system that features both 8-bit and 16-bit microprocessors. The Model 16 reportedly can also be used as part of a local-area network, via Datapoint Corp.'s Arcnet, and can function as an intelligent office workstation. The system starts at $4,999, the vendor said from Fort Worth, Texas.

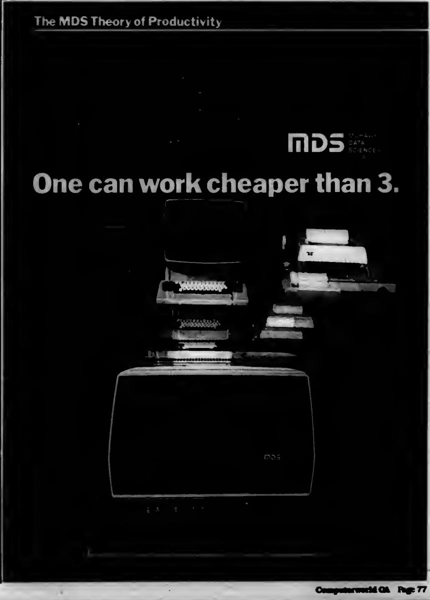
A portable, hard-copy terminal has been introduced by **Digital Equipment Corp.** The Correspondent features impact printing, uses plain paper, weighs about 20 lbs and was designed to be used either as a standalone terminal for minicomputer systems or as a portable executive workstation. It is scheduled for release this summer, at $1,995, according to the vendor at 146 Main St., Maynard, Mass. 01754.

**Ungermann-Bass, Inc.** has expanded its Net/One local-area network product line to include broadband as well as its Ethernet-compatible baseband system. The basic broadband system would cost approximately $27,000 plus a one-time software charge of $5,000. The Net/One software development support package is currently offered free to users, the firm said from 2560 College Blvd., Santa Clara, Calif. 95050.

**Wang Laboratories, Inc.** has introduced enhancements to the entry-level systems of its OIS office automation systems series. The OIS-1 offers 4.2M bytes of storage, the DW-20 printer and a 32K-byte CRT terminal. It costs $12,995. The OIS 115-3 has 16M bytes of storage, eight ports and sells for $15,400.

The new 115-4 CPU comes with 32M bytes of storage, eight ports and costs $21,400. The enhanced OIS 115-2 CPU with 8.4M bytes of storage has been reduced to price to $10,400. Software is available at no charge, the vendor said.

More information is available from Wang Laboratories, Inc., One Industrial Ave., Lowell, Mass. 01851.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April 5-7, San Francisco — **Third Annual Office Automation Conference** Contact: American Federation of Information Processing Societies, 1815 N. Lynn St., Arlington, Va. 22209.

April 5-9, Washington, D.C. — **James Martin Seminar.** April 19-23, Boston, and May 3-7, Chicago. Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

April 12-14, Chicago — **X.25 and Other Protocols for Long-Haul and Local-Area Networks.** Also May 24-26, Washington, D.C. Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

April 13-14, Washington, D.C. — **Selecting a Local Network.** Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424.

April 14-16, Portland, Ore. — **Local-Area Networks.** Also April 28-30 and May 5-7, Stamford, Conn. Contact: American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940.

April 14-16, Houston — **Planning for Office Automation: Concepts and Practices.** Also April 28-30, Washington, D.C.; May 3-5, Denver; and May 10-12, New York. Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

April 14-16, Dallas — **Integration of Word Processing and DP Systems.** Also April 26-28, Chicago, and May 10-12, Washington, D.C. Contact: Seminar Department, Datapro Research, 1805 Underwood Blvd., Delran, N.J. 08075.

April 19-21, Boston — **Introduction to Word Processing: Concepts, Systems and Applications.** Also May 3-5, Chicago. Contact: Seminar Department, Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

April 26-28, Orlando, Fla. — **Networking Alternatives in Data Communications.** Contact: Dataquest, Inc., 19055 Pruneridge Ave., Cupertino, Calif. 95014.

April 27-29, Carmel, Calif. — **Multimedia Teleconferencing.** Contact: The Institute for Graphic Communications, Inc., 375 Commonwealth Ave., 12th Floor, Boston, Mass. 02115.

April 28-30, New York — **Strategic Planning for Office Automation.** Also May 5-7, Beverly Hills, Calif., and May 19-21, Chicago. Contact: Advanced Office Concepts Corp., Suite 433, One Bala Cynwyd Plaza, Bala Cynwyd, Pa. 19004

May 2-5, Miami — **Strategies for Office Systems.** Contact: International Data Corp., 5 Speen St., Framingham, Mass. 01701.

May 3-6, St. Louis — **Micrographics: New Importance for the '80s.** Contact: Meetings and Expositions Department, The National Micrographics Association, Sue Wolk, Meetings Coordinator, 5719 Colesville Road, Silver Spring, Md. 20910.

May 23-25, Andover, Mass. — **The Digital Facsimile Explosion.** Contact: Institute for Graphic Communications, Inc., 375 Commonwealth Ave., 4th Floor, Boston, Mass. 02115.

May 25-27, Andover, Mass. — **Advances in Document Storage and Retrieval.** Contact: Institute for Graphic Communications, Inc., 375 Commonwealth Ave., 4th Floor, Boston, Mass. 02115.

May 25-27, Detroit — **Office Expo '82.** Contact: International Office Expositions, Office Expo '82, 25024 W. Warren, Dearborn Heights, Mich. 48127.

June 4-5, Chicago — **Word Processing/Data Processing.** Also June 11-12, Houston. Contact: John Wiley & Sons, Inc., 605 Third Ave., New York, N.Y. 10158.

June 8-10, Houston — **1982 National Computer Conference.** Contact: Information Processing Societies, Inc., 1515 N. Lynn St., Arlington, Va. 22209.

June 21-24, Willow Grove — **International Word Processing Association Syntopican X.** Contact: International Word Processing, 1015 N. York Road, Willow Grove, Pa. 19090.

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Codex Corp. .......... 46-47
Communications Electronics .......... 5
Computer Corp. of America .......... 14
Control Data Corp .......... 60
Cullinane Database Systems, Inc. .......... 7
CW Office Automation .......... 50

Data General Corp. .......... 29-32
Data-MATE .......... 38
Datapoint Corp. .......... 16-17
Delta Data Systems Corp. .......... 22
Dimensions Press .......... 64

Eastman Kodak Company .......... 75
EEC Systems .......... 71

Financial Software, Inc. .......... 70
Four-Phase Systems .......... 66

General Electric Company .......... 6

Hannagan & Associates, Inc. .......... 78
Henco .......... 20
Hendrix Electronics .......... 52
Hewlett Packard .......... 2-3
Honeywell Information Systems .......... Cover 2

Inmac .......... 71
Integrated Technologies, Inc. .......... 12

The Koffler Group .......... 13, 74

Lanier Dictating Systems .......... 56-59
Leading Edge Products, Inc. .......... Cover 3

Mannesmann Tally .......... 33
MDS Mohawk Data Sciences .......... 77
Media Systems Technology .......... 66

NCR Corp. .......... 62

Polaroid Corp. .......... 53
Prestige Expositions .......... 34

Raytheon Data Systems .......... 28

Satura Systems, Inc. .......... 10

Technology Transfer Institute .......... 49
Televideo Systems, Inc. .......... Cover 4
Terminals Unlimited .......... 37
3M Company .......... 36

Verbatim .......... 26
Visual Technology, Inc. .......... 43

Wabash DataTech, Inc. .......... 54
Wang Laboratories, Inc. .......... 40-41

Xerox - OPD .......... 18-19
Xerox - Printing Systems Division .......... 72-73

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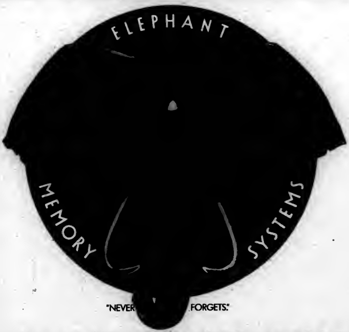

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